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ALBERTA

Where the Mountains Meet the Plains

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with George S. Tomkins

and Neville V. Scarfe

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ALBERTA



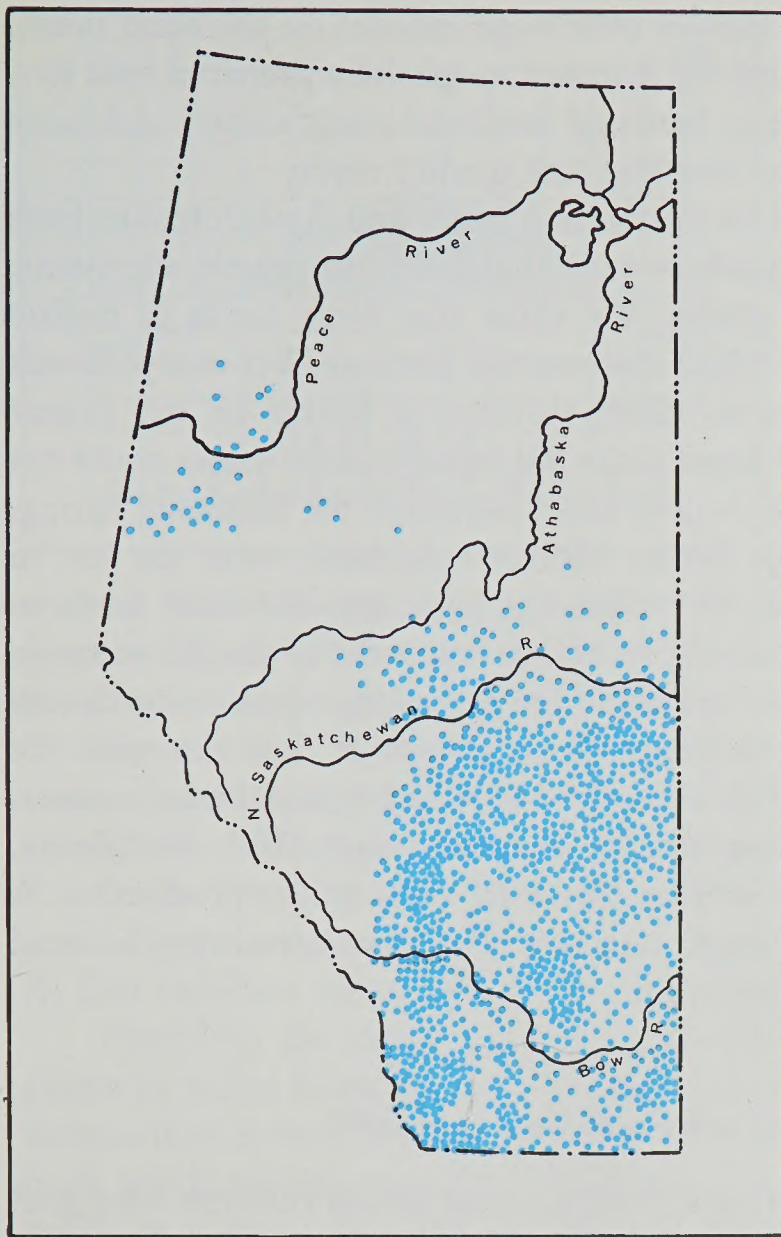
Where the Mountains Meet the Plains

One cold day in late fall the Queen of Canada (then Princess Elizabeth), huddled in furs, watched some of the world's best cowboys breaking in horses, lassoing cattle, and performing other feats. She was visiting Calgary. The famous Stampede is normally held every July. Many thousands of people come to see the Indian braves parade in their ceremonial costumes, and to watch cowboys compete in the rodeo events as shown in Figure 8-1. This is such a noted attraction that a special display was held so that the Princess could see it, even though wintry conditions made the activities more difficult and more dangerous.

Figure 8-2 shows why Alberta is famous for its cattle. According to Figure 8-3, in which agricultural belts are large numbers of cattle raised?

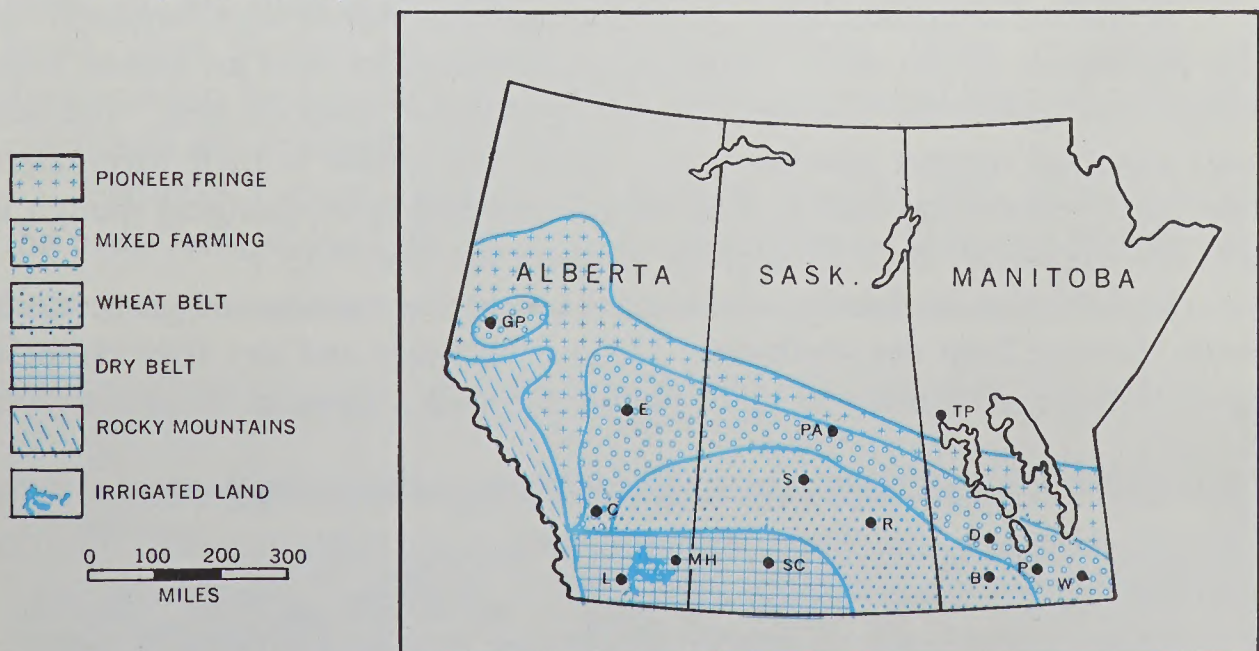
8-1. An exciting moment at the Calgary Stampede (Alberta Department of Industry and Development).





8-2. Distribution of beef cattle in Alberta.

8-3. The agricultural regions of the Prairie Provinces.



In some parts, hardy animals wander over huge ranches on the open range. In other places, animals are carefully fattened in specially prepared feed lots. Thousands of mixed farms keep herds of beef and dairy cattle, and some ranches are devoted entirely to breeding fine quality stock.

The large grassland areas of southern Alberta and Saskatchewan have always been grazing lands. Scientists think that long ago camels, elephants, and rhinoceros roamed these plains. We know that huge herds of buffalo grazed this country before the white men started farming. Yet everyone was surprised in 1877 when domestic cattle survived a winter on the prairie grasses. They had been turned loose in the fall because their owner could not sell them. After they were picked up in good condition the following spring, settlers began to bring in large herds. Alberta rangelands were the last in North America to be occupied. There has not been time for these lands to be spoiled by over-grazing, and Alberta today has some of the finest range land on this continent. If grasses and plants are grazed too often or too closely the plants die. When there is no vegetation a shower of rain can wash the soil away. In dry seasons it may blow away. Soon only a barren desert remains. It is difficult, and sometimes impossible, to restore such land. In Alberta, grazing is carefully controlled so that this land will remain productive. A farmer who leases range land may graze only as many animals as the land can feed without becoming worn out.

The Chinook Wind or snow-eater—friend or foe?*

On a Saturday, in a recent February, many Calgary school children were glad to be able to stay indoors. For several days a bitter northwest wind had been blowing in the city. Temperatures had been low. The highest temperature reached on Saturday afternoon was only 4°F.

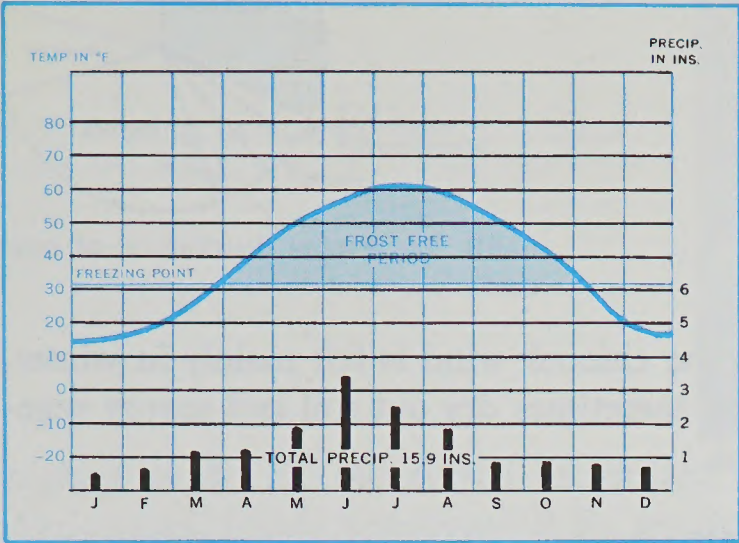
In the late afternoon many people noticed that clouds were forming over the mountains to the west. These clouds appeared to have an arched edge silhouetted against the clear sky. People talked of the "chinook arch," and said they expected warmer weather soon. Those who looked at their barometers saw that pressure was falling. The weather seemed to be changing though it was still very cold. At 2:30 a.m. the temperature was -13°F.

By 3:00 p.m. on Sunday afternoon the snow was melting and gusty winds were blowing from the southwest. The air felt warm and dry after the cold spell. The temperature was 38°F. How much had it risen in the past twelve hours?

On Monday afternoon the temperature began to fall again. Barometers showed rising pressure. The humidity increased and fresh snow fell. Another chinook wind had come and gone.

Chinook winds are an important factor in southern Alberta and south-

*For information on the chinook winds the authors are indebted to Professor R. Carswell and Mr. J. Marsh of the University of Calgary.



8-4. A climatic graph of Calgary.

western Saskatchewan. They provide welcome relief during the long, cold winters. Figure 8-4 is a climatic graph for Calgary. For how many months is the average temperature below freezing?

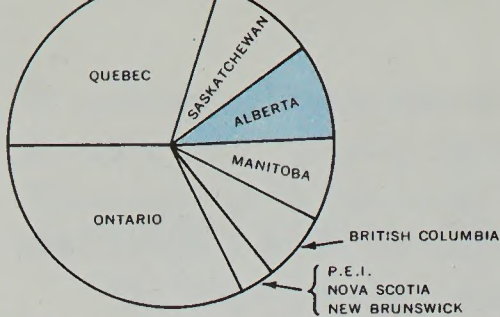
From which direction do the chinook winds blow? As these winds sweep down the eastern slopes of the Rocky Mountains they are warmed by compression. They may raise the temperatures as much as 60 degrees in a few hours. The thin snow cover quickly melts so that animals can reach the grass. Cattle can graze outdoors all year despite the cold winter temperatures. At first ranchers relied entirely on natural grasses.

However, the chinook is unreliable and unpredictable. The number of chinooks varies from year to year. Some chinooks last longer and are more intense than others. Though generally considered a benefit to ranchers, these freak winds may cause serious problems. Rapid changes in temperature may result in a cover of solid ice forming when the chinook ceases and temperatures fall. If there is an unusually long cold spell, or if the snow cover should be thicker than usual, few animals can survive a winter on the range. In the winters of 1886-7 and 1906-7 such conditions caused heavy losses. Now farmers provide hay when necessary. What inventions and developments have made it possible for farmers to protect their animals when conditions are unusually difficult?

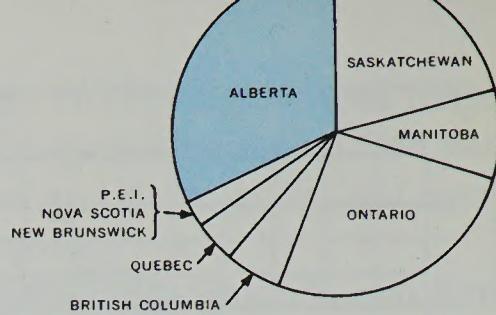
Figure 8-5 shows cattle on the range in the Dry Belt. Grazing is still the main form of land use in Southwestern Alberta. How can you tell that

8-5. Cattle on the range in Southwest Alberta (Alberta Department of Industry and Development).





8-6A. Percentage distribution of dairy cattle.



8-6B. Percentage distribution of beef cattle.

this area is rather dry? Though the chinook wind is felt mainly in winter, chinook type winds from the west sometimes dry out soil and scorch vegetation during the summer months.

The importance of cattle in Alberta

Many products are obtained from cattle. Make a list of all such items to be found in most Canadian homes. They may include fresh and processed foods, preserved food, and some non-food products.

Figure 8-6 shows how important Alberta is in producing these items. Dairy cattle are kept chiefly for their milk, from which cream, butter, and cheese may also be made. The cows must be milked every day and the fresh milk is usually picked up by truck and taken to the nearest town. There it is processed and bottled. It is usually pasteurized and may be sold in various forms such as homogenized, skimmed, or chocolate milk. Butter, cheese, cream, and ice cream are often made and sold locally. Other dairy products, such as some cheeses and powdered or canned milk, do not need to be used immediately and can be sold over a wide area.

Distance from the processing plant and ease of transportation influence the sales of milk. For example, a farm located near a main road can send its milk to market more cheaply and quickly than one in a more remote location. Usually the farms surrounding a town or city send their milk to that centre to be processed and sold. The area which supplies a centre of population is known as a *milkshed*. The dairy farms around Calgary are said to be in the Calgary milkshed, those supplying Edmonton to be part of the Edmonton milkshed. A dairy farmer in the Red Deer area might market his milk in either Calgary or Edmonton according to various local factors.

Some milk is fed to other animals on the farms. In addition to cattle raising, Alberta is also a leading producer of sheep, pigs, horses, and poultry. Figure 8-6 shows that Alberta is famous for its beef cattle rather than its dairy herds. Suggest why Quebec and Ontario each have a greater percentage of Canada's dairy cattle than Alberta.

About what proportion of Canada's beef cattle is raised in Alberta? This province takes pride in the quality as well as the quantity of its beef cattle. Of 267,000 butcher steers and heifers marketed in 1968, about 47% were graded "choice" and a further 29% "good." These are the two

8-7. Moving from a dry farm to irrigated lands (P.F.R.A.).



highest grades of the eleven recognized by the Canada Department of Agriculture, which is responsible for grading carcasses.*

Animals sold for food are graded at the packing plants after they have been slaughtered. The blue or red stamps you see on fresh meat in the supermarket are applied at this time. The poorer quality meat may be used for making canned meats, meat extracts, or soups.

After the meat has been used, the bones, horns, hoofs, and hides of the animals are often used for various by-products including leather, glue, and fertilizers.

Refer back to Figure 8-2. In which parts of Alberta would you expect to find mostly dairy cattle? Which parts are suitable for fattening choice animals? Give several reasons why Alberta is famous for its cattle.

Modern farms in Palliser's Triangle

The British portion of the arid country is a triangular region, its apex reaching to the 52nd parallel, while its base, applied along the 49th, extends between Long. 100° and 114° W. . . . on the whole, it must be described as deficient in wood, water, and grass.*

This was how the Palliser expedition of 1857-60 described the dry lands of southern Alberta and Saskatchewan. This area, which became known as "Palliser's Triangle," corresponds approximately with the present day ranching, dry farming, and irrigated region shown in Figure 8-3. Drought is still the major problem but careful research into suitable methods has enabled this area to become a major producer of grain, vegetables, livestock, and poultry.

Canada's most successful irrigated farmlands

Figure 8-7 shows a settler and his family moving their house. After years of struggle he gave up trying to farm his land in southern Alberta. His crops

*For information used in this section the authors are indebted to the Livestock Division, Canada Department of Agriculture.

**James Hector, "On the Capabilities for Settlement of the Central Part of British North America," *Edinburgh New Philosophical Journal*, New Series XIV(1861). Quoted from John Warkentin, *The Western Interior of Canada*, Carleton Library, McClelland and Stewart Ltd., Toronto, 1964.



8-8. An aerial view of irrigated fields near Hays (P.F.R.A.).

withered and died, for there was not enough moisture. Each year the land became drier, dustier, and less and less productive. So he left, but not as a beaten and disappointed man. He exchanged his dry land for 120 acres in the Hays Irrigation District. The Federal Government and the Prairie Farm Rehabilitation Administration helped him move to his new farm. Here water is available from canals and ditches. The aerial photograph in Figure 8-8 shows how these ditches divide the land in a mosaic pattern. He pays a fee for the use of water and the P.F.R.A. gives him advice on how to change from dryland to irrigation farming successfully. He must learn how to supply enough irrigation water at the right time to produce a good crop. If too much water is used it washes the richness out of the soil. Also, he must pay for the water he uses and therefore he does not want to waste it. He learns how to prepare the soil and how to protect it from *erosion* by wind, water, and hail. If fields are carefully tilled a good deal of stubble and trash can remain on the surface. It holds the soil in place just as trees and grass do. This prevents the soil from being blown away by the high winds that are common in this area. *Shelterbelts* of trees not only provide protection from the wind for farm buildings and animals, they also decrease the speed of the wind on the sheltered side. Trees planted round a dugout can delay the melting of spring snow and so preserve a greater supply of water.

His old farm is now being turned into grassland and will become part of a community pasture where he may send his own animals for summer grazing.

8 He will pay $3\frac{1}{2}$ cents per day for each cow. The animals will be supervised,



8-9. Irrigated cornfields in the Alberta Dry Belt (P.F.R.A.).

and branding, inoculation, and breeding services will be provided for an extra fee. This land, which was not suited for cultivation, is now being productively used as pasture.

“Cornfields in a drought area”

Captain Palliser described the basin of the South Saskatchewan River as a “true arid district (which) can never be of much use to us as a possession.” Today the irrigated lands of Alberta, most of them in the river basin so described by Palliser, produce nearly 20 per cent of the province’s farm income though they include only 4 per cent of Alberta’s farmland.

The Hays Irrigation District is a new development. Figure 8-9 shows irrigated farmlands in the St. Mary Irrigation Project which began more than twenty years ago.

1. What feature of the land surface helps make irrigation easy?
2. Why are there so few trees? Suggest why they are growing in rows.
3. The large building is a sugar factory. What crop does this suggest is important here? The tall crop in the foreground is corn. Peas, potatoes, and various other vegetables make this an important truck farming area. British Columbia, with its shortage of agricultural land, is a big market, as are the rapidly growing prairie cities. Many vegetables are canned.



8-10. Dry farming in the Alberta Dry Belt (Alberta Department of Industry and Development).

4. Some of the smaller buildings shown are for stock. Sugar beet tops, beet pulp, pea vines, and poorer quality vegetables can all be used as animal feed. Some grains are grown specially for feed, as "finishing" cattle and lambs is an important industry. Animals are brought in from the range and kept in feedlots to be fattened before they are sold. Hog raising and poultry farming are also important sources of income on irrigated farms. About one third of the land is usually seeded to wheat. Wheat acreage is highest in the districts with no facilities for handling specialty crops. Nearly a million acres are already "under the ditch" in Alberta, and the area grows every year. The South Saskatchewan River Project is now adding another large area of irrigated land in the Prairie Provinces.

A change for the better

The boys sitting on the roof of the house in Figure 8-7 moved only a few miles to their new home.

- (a) Why did the family decide to leave their first farm?
- (b) How is the new farm different?
- (c) Why was the move a good thing for the old farm?

Crops are also grown without irrigation water in the Dry Belt

The irrigated lands are rich and prosperous. They produce a great deal of food. Yet these lands form only a small part of the Dry Belt. Most of the area battles the problem of an insufficient and unreliable water supply. The farmer who owns the land shown in Figure 8-10 has no irrigation system available. He is practising *dry farming*. How are the dark colored patches being used? How did this land look twelve months before this picture was taken?

Figure 8-11 is a view seen by thousands of travellers on our trans-continental airways. You are looking from an aircraft directly down on dry farming country in southern Alberta.

Except for the river banks the land is quite flat and almost all of it is under cultivation. How does the photograph suggest that these fields are flat? The patchwork pattern of brown and gold strips covering the earth's surface for hundreds of square miles is one of the most exciting views for the air traveller.

Wheat is the chief crop of dry farming, but no more than 15 bushels to the acre can be produced by these methods. As much as 65 bushels may be produced on similar land using irrigation water. Imagine you are the farmers concerned. Think of the work you must do and the expenses you must meet before harvesting your crop. Why can a carload of wheat from a huge "dry" farm afford to compete in price with the product of a small irrigated field?

Some of the world's finest wheat is grown in Alberta

Alberta has long been noted for the quality of its wheat. When the international competition was first held in Chicago in 1893, the highest award for wheat was won by John Brick. His farm was on the Peace River. His entry had to be hauled by oxen and by dog team to Edmonton. Heavy trucks on all-weather roads are now used to carry wheat to the railways. Albertan entries are still winning high awards in agricultural competitions.

8-11. A bird's-eye view of farmland in the Dry Belt (R.C.A.F.).



8-12. Farm cash income in Alberta

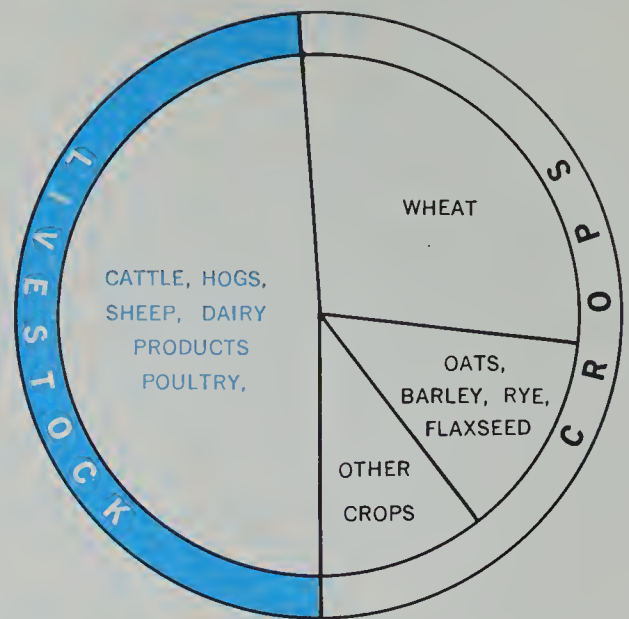


Figure 8-12 shows how important wheat and other grains are in the province of Alberta. About what proportion of total farm income is accounted for by wheat alone? How does wheat compare in importance with other crops?

Wheat is widely grown in the Dry Belt, Wheat Belt, and Mixed Farming Belt. Combine harvesters are a common sight in the large fields, and grain elevators rise high above the landscape in many towns and villages.

Selling the crop

A government agency, the *Canadian Wheat Board*, markets all the wheat, oats, and barley grown in the Prairie Provinces, except what is used locally for seed and feed. All the grain elevator companies (including co-ops) buy grain for the Wheat Board from farmers. The Board pays these companies a set rate per bushel for handling and storage. The Board then sells the grain to millers, malters, and other processors both in Canada and in foreign countries. When the farmer delivers his grain to the country elevator, he is paid only part of its value, known as *initial payment*. After the Board has sold most of the crop and paid the expenses involved, the farmer will receive a *final payment* based on how much profit the Board has made.

So much grain is grown on the prairies that it takes a whole year or more to move it out to the terminals and dispose of it. Prairie farmers can deliver grain to the elevators much faster than it can be shipped out. In order that all farmers will have an equal chance to sell their grain, a quota is set by the Wheat Board allowing each farmer to sell a limited amount at any one time. The quota is increased during the year as the railways move the grain away and make room in the elevators. Thus the Canadian Wheat Board ensures orderly and efficient marketing.

The grain is moved by rail from the country elevators to the large terminal elevators, such as those at Thunder Bay or Vancouver. What

DESCRIPTION

LOCATION: Kesisville, Alberta, 34 miles from Innisfail, Canadian Pacific R.R. 50 N.E. at Red Deer. Edmonton 150 miles N.E., Calgary 100 miles S.E. 4-lane highway connects these cities. Both cities offer jet service to Europe, Canadian and U.S. cities.

ACREAGE: 3,678 acres more or less. 25 miles of fencing. 15 fields from 4 acres to 200 acres. 1,800 acres in grain, hay and permanent pasture. 300 acres timber. Balance grazing land and bush. **Additional 160 acres on long term lease.**

TOPOGRAPHY: Ranch level to gently rolling. Soil mostly grey-wooded. Abundance of water. Water system for all buildings. No irrigation required.

CLIMATE: Pleasant summer temperatures. Snowfall not excessive. Ranch lies in warm Chinook belt where snows melt rapidly. Most cattle and sheep winter outside.

TIMBER & OIL: Stands of spruce and pine sufficient for all ranch requirements and outside sales if desired. 5 producing oil wells. 2 more scheduled this year. Exploration continuing.

LAND USE: Ranch now operates as commercial beef cattle with feeder facilities. Quarter horse breeding as sideline. Hay averages 2½ tons per acre. Grain yields excellent. Farm hay and silage sufficient to carry 500 head brood cows.

Eight-year clearing program has averaged 150 acres per year. When clearing is completed, 90% of entire acreage will be productive. Estimated carrying capacity 1,000 brood cows plus calves plus feeder operation.

MANAGEMENT: Resident foreman with 8 years' experience is most capable and wishes to continue.

RECREATION: One trout stream. Fishing in many other streams. Deer and grouse. Big game in Rockies to the West.

BUILDINGS: Main residence 6 rooms (3 bedrooms, two baths). Guest cabin. Manager's home. Ample corrals, paddocks, stalls. All necessary farm buildings to support farm operation. New 22,000-bushel grain elevator.

8-13. A real estate advertisement describes an Alberta ranch.

Canadian ports have large terminal elevators? The *Crows Nest Pass Agreement* of 1897 between the railways and the Canadian Government makes it possible to move grain by rail at low rates. The railways agreed to haul grain to the terminals at the low rate of \$5.40 per ton, and the government gave them large grants of land and mineral rights in western Canada. The railways cannot increase this freight rate without the consent of the government.

Because grain farmers on the prairies face a great many hazards, such as drought, hail, frost, plant pests and diseases, and even floods, the Canadian Government in 1939 passed the *Prairie Farm Assistance Act* (PFAA). This requires all farmers in the west to pay into a special fund one per cent of all the money received from grain sold to the Wheat Board. From this fund, the government pays out assistance to farmers in areas of crop failure. Thus this is a form of crop insurance, administered and assisted by the government and paid for mainly by the farmers themselves.

Much Alberta Wheat is exported via Vancouver and Prince Rupert, even if it is going to Europe. By what route does it reach the United Kingdom? What advantage does this have over the St. Lawrence route? What other large wheat markets are best reached through Canada's Pacific Coast ports?

The rich farmlands of the Mixed Farming Belt

Figure 8-13 is part of an advertisement which appeared in many Canadian newspapers a few years ago. It describes a farm in the rich mixed farming zone of Alberta. Imagine that you are interested in buying this property.

Underline all the words which tell you what this farm looks like and what it produces.

1. How would you get there? Why is it favorably located with regard to cities and transportation?

2. How large is the farm? It is much larger than most farms in this belt. Most are no larger than 320 acres.

3. How much of the land is in crops or permanent pasture? How do you know that grain is grown for sale? Why is a large proportion of the field crops kept for use on the farm? What is the greatest advantage this farm has over the Dry Belt farms?

4. What is the soil like? These soils often require large quantities of fertilizer. They are very well suited to producing feed grains. Much of the soil in the Mixed Farming Belt is in the black soil zone. This soil is very rich and holds moisture well. Why is this an advantage on the Canadian Prairies?

5. What animals are kept? Which are the most numerous? Why can they spend the winter outdoors?

6. What non-agricultural "crops" can be obtained from the farm?

7. Why would this farm be a pleasant place in which to live?

Though this property is much larger than most in the Mixed Farming Belt, in its appearance and functions it is typical of the area. These farmlands are more like those of Southern Ontario than any others in the Canadian West. It is a rolling, rich countryside with many groves of trees. With about eighteen inches of precipitation a year, irrigation is seldom necessary. Early or late frosts are sometimes a problem as the frost-free period is only 100 to 120 days. Compare this with the length of the growing season at Hamilton. Here is a newspaper report of a storm which struck the area one July.

HAILSTORM POUNDS ALBERTA, CAUSING \$2 MILLION DAMAGE

CALGARY — The worst hailstorm in Alberta's history ripped through the the central part of the province late Friday.

The storm wiped out crops and caused heavy damage to buildings in its path. Hailstones as big as hen's eggs fell in the Red Deer area. Stones the size of golf balls were reported in other regions. . . .

Some areas measured from three to six inches of hail. . . .

Up to 1 ½ inches of rain fell and winds gusted to 70 miles an hour.

The city of Red Deer suffered the brunt of the storm with windows broken, streets turned into rivers, sewers backed up and gardens heavily damaged.*

How big were the hailstones ? In addition to hail, in what other ways did the storm cause damage ? Hail is not uncommon on the prairies and is one of the farmer's greatest enemies. Insurance is his only protection against the loss of his crop.

Most of the land is being used for grains or fodder crops. Beef cattle are bred and fattened on these pastures, and dairy herds supply the needs of Calgary and Edmonton. Hens and pigs are very important. Farms supply their own eggs, butter, milk, beef, pork, and vegetables. Cash is obtained by selling beef cattle, hogs, and wheat. The sale of milk, cream, and eggs provides a smaller but steady income.

Enough wood is usually available for farm requirements, but few farmers cut lumber for sale. Many have oil pumps in their fields. These are small and do not prevent the farmer from using the land for either crops or animals.

Successful farmers must understand how to use their land in the best possible way. They must find out about the soil and climate. They must learn about new machinery, new varieties of seed, and methods of production. The federal and provincial governments help keep farmers informed of new developments and research. Publications, short courses of study, and field advisers all help farmers to keep up to date. Many farmers attend demonstrations and exhibitions at fairs and auctions. 4-H clubs help young people to play their part in good farming methods. Boys and girls raise their own animals and show them. They can also enter competitions for food, gardening, and home-making projects.

The farmers must also understand business methods and bookkeeping. In this way they can make a maximum profit. At the same time they must be sure that they do not over-graze or over-crop their land. They must protect it from floods and soil erosion so that they can conserve a valuable resource for future generations.

The Pioneer Fringe

Figure 8-14 shows a portion of the Peace River area of Northern Alberta. It was in this section that the prize-winning wheat was produced in 1893. How has transportation improved today ? Some fine farms have been developed in the Peace River District. There are areas of deep black soil where both wheat and livestock can be raised very successfully. Much of the best land has now been cleared and developed for farms, but many areas are still available. Here are some extracts from the description of the lands shown in Figure 8-14.

“Construction of dams or dugouts is necessary to assure the settler of an adequate farm water supply.”



8-14. Part of the Peace River area of Northern Alberta.



8-15. The forested areas of Alberta.

"Soils are brownish colored silt loams that have very few to no stones."

"Much of the land has a medium to fairly heavy tree cover. Many of the low ill-drained areas have an accumulation of moss peat and variable stands of black spruce."

Anyone who wishes to settle on this land must live on it for part of every year and must break and seed ten acres each year. What are the chief problems facing a pioneer farmer in this area? How are they similar to those of the pioneers in the Wheat Belt fifty years ago? More road, rail, and air connections are being built. Routes to the Pacific coast have become especially important in the last few years. Oil and natural gas have already been developed in the Peace River District, which is now linked by pipeline to Vancouver. A large dam, now being built on the British Columbia section of the Peace River, will provide huge quantities of cheap power.

The pioneer fringe area of Alberta extends over a wide area of the northern and western sections of the province. A large area (nearly five times the total area of Prince Edward Island) of good farmland is available. Several hundred

new farms are being opened up each year. As farmers and scientists discover better ways of clearing and using these lands, they may contribute a great deal to our food supply.

The varied agricultural lands of Alberta

1. Alberta has many different types of farms. In which sections would you expect to find each of the following:

- (a) Newly cleared fields in the forest being seeded with wheat.
 - (b) Prosperous mixed farms in rolling, well wooded countryside.
 - (c) Brown fallow fields alternating with golden wheatfields.
 - (d) Fields of corn, sugar beets, and vegetables with canals running alongside.
 - (e) Cattle grazing around a waterhole on the treeless open range.
- Discuss how each of the agricultural regions described above is suited to the conditions of the area where it is found.

2. (a) What are the chief problems faced by the farmers in the various parts of Alberta? How are they being overcome?

(b) How is Alberta increasing the acreage of its farmland every year? Why is there a demand for increased agricultural production?

3. (a) What food products does Alberta produce in sufficient quantities to sell to other places?

(b) Why is Alberta particularly suited to growing large quantities of these crops?

Alberta's forest wealth

Most visitors to Alberta cross the province in an east-west direction. Many are heading for either Edmonton or Calgary. They see the wheatfields and the cattle, the grain elevators and irrigation dams. They soon become used to the sight of oil drums, derricks, or tanks dotted over the landscape. But few remember Alberta as a land where forests stretch to far horizons. According to Figure 8-15 what fraction of the province is forested? This area is twice as big as the whole of Southern Ontario. Figure 8-20 taken west of Red Deer shows how these parts of Alberta look. Trappers, loggers, prospectors, and a few adventurous hunters are the only people who know these forests for they are not easily reached from the parts where most people live.

One of the oldest established forest industries in Alberta is tie making. Large quantities of ties were required during the era of intense railway building. Sawmilling accounts for the greatest volume of timber at present. Telephone poles, fence posts, building logs, and plywood are produced by more than a thousand wood products firms.



8-16. Carrying pulpwood to the Hinton Mill (Northwest Pulp and Power Ltd.).

Pulp making — a new industry for Alberta *

In 1957 the first pulp mill to be opened in Alberta started producing. Figure 8-16 shows a truck carrying logs to the mill. Compare this with Figure 9-18. Why are these logs more suitable for pulp making than for constructional lumber? How does this photograph help explain why poles, posts, and railway ties have always been important products of Alberta forests?

The man driving the truck is a newcomer to this area. Before the mill was built in 1954, only 180 people lived in Hinton. Within five years the population had reached 3,400. A high smoke-stack, a huge water tower, cranes, and other industrial buildings and equipment now dominate the landscape. Many roads lead into the bush where eight logging camps have been established. Large trucks are constantly bringing fresh supplies of logs to the woodpiles, and lines of freight cars take away bales of pulp to the markets in the eastern United States. In 1968, about 520 tons of pulp were produced every day.

Making the most of resources

Ten thousand acres of woodland must be cut over every year in order to meet the mill's requirements. Patch logging, reseedling, and careful control of cutting ensure that in about eighty years' time another crop of trees will be ready for harvesting. Give several reasons why it is not wise to strip away all the forest cover without thought for the future.

Making pulp also requires huge quantities of power. In order to save as much as possible, all the bark and waste wood is burned in the furnaces. Gas provides the rest of the power. Chemicals used in the cooking process

*For information used in this section the authors are indebted to Mr. R. Tubb of the Northwest Pulp and Power Ltd.

are recovered to be used again, and water is reclaimed to be used over and over again.

Finally, adhesives, paints, varnishes, linoleum, polishes, soaps, and disinfectants are produced from the by-products of the cooking system. Special machinery has been installed in the smokestacks and tanks, so that the air and water around Hinton will not be polluted by waste materials.

The pulp mill has provided many new jobs in Alberta and has contributed to the wealth of the province. More forest industries are being developed each year, and its forests are one of Alberta's great natural resources which may become more important in the future.

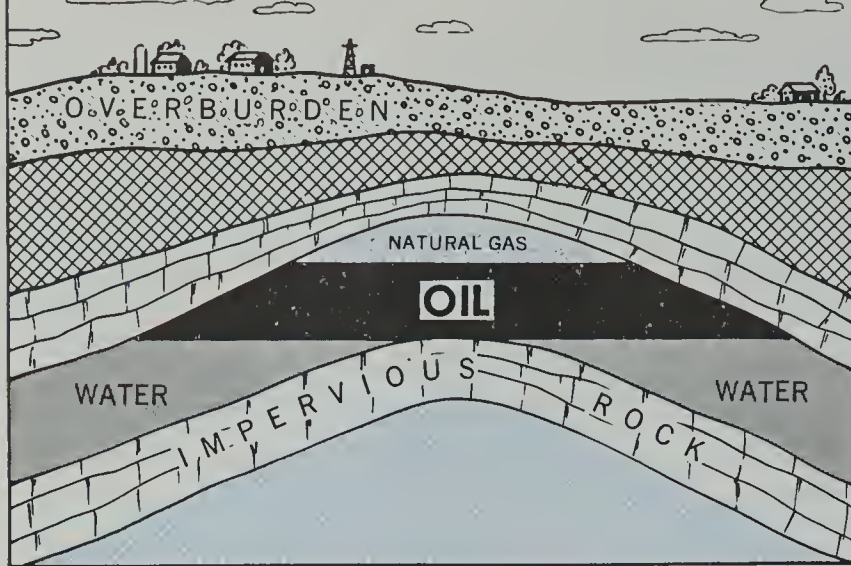
Success in the search for oil

Have you ever thought of how many things you use each day that need oil. Perhaps your house or school uses oil in its furnace. You may ride your bicycle or a bus to school. Father puts oil in his car and lawn mower. Mother's washer would soon wear out without it. So would the machines in the factories which make all the things we use — everything from snow-ploughs to sodas. Each day we use up enormous quantities of oil, and men are always searching for new supplies.

In Alberta the search was successful. As a result, thousands of people have moved into this province, and the cities of Calgary and Edmonton have almost doubled their population in ten years. Many people make a living prospecting for oil, getting it out of the ground, moving it, and selling it. Huge new refineries have grown up. Factories using oil for fuel or making by-products from oil provide more jobs. Oil has helped to make Alberta one of Canada's richest provinces. Figure 8-17 shows that industry and agriculture both provide wealth for present-day Alberta.

8-17. Two of Alberta's greatest sources of wealth (Alberta Department of Industry and Development).





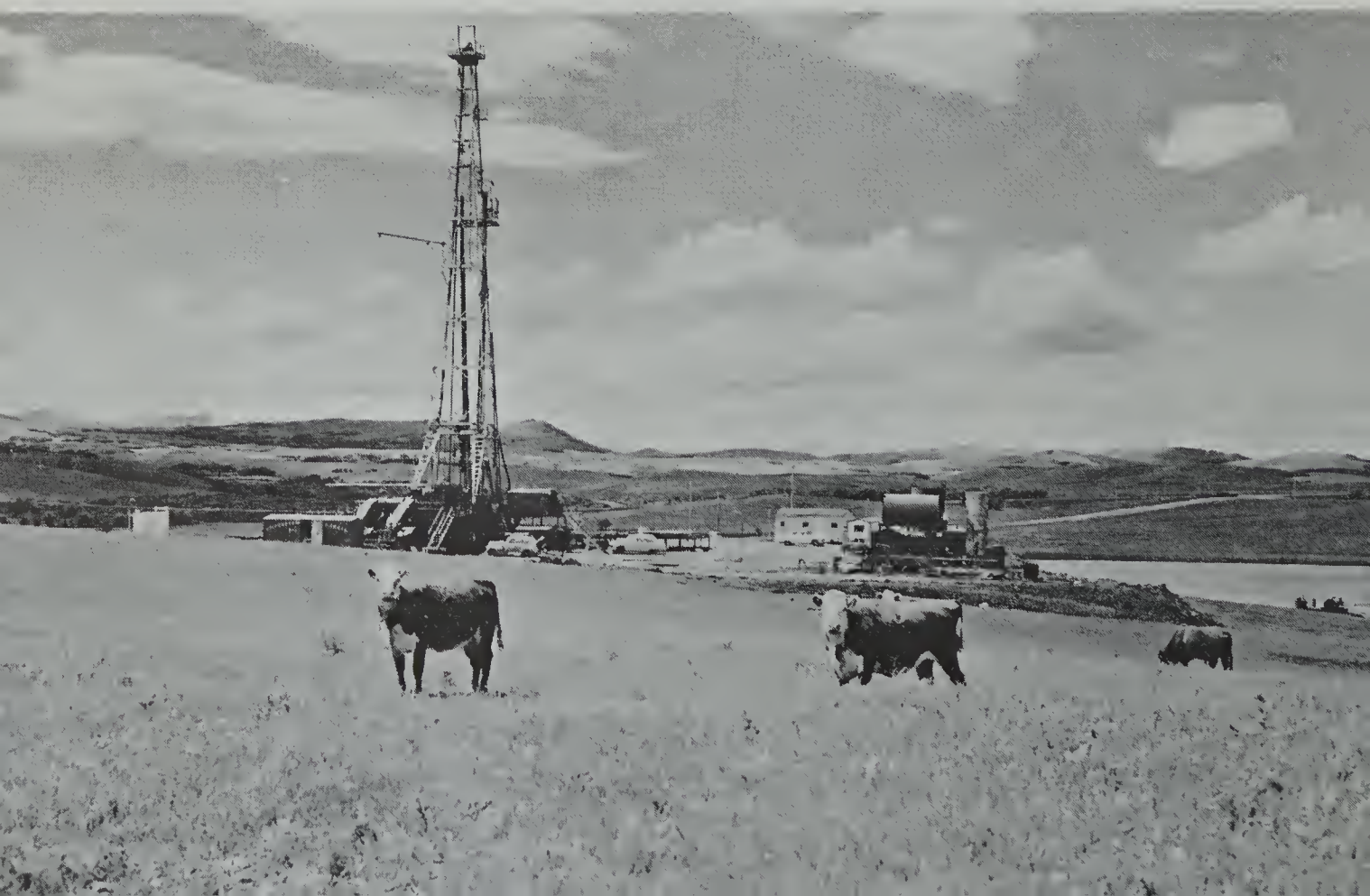
8-18. Diagram of an oil well.

Finding the oil wells

Pumps, derricks, drills, tanks, and trucks are now a very common sight around Edmonton and Calgary. It seems as if the whole area must have a vast pool of oil underneath. But finding oil is a difficult and expensive process. Many people may work for many months before a new well is opened.

Most scientists think that oil was formed from the bodies of tiny animals and plants that lived in sea water millions of years ago. So they look for oil in rocks that were laid down by ancient seas. They do not waste time looking in rocks that were poured from volcanoes or laid down recently by rivers. Geologists have learned that oil often collects in dome-shaped rock formations, as shown in Figure 8-18, so they try to find places where the rocks have been formed in this way.

8-19. Drilling a well on the open range (Alberta Department of Industry and Development).



Only in the side of a canyon wall can the geologist see the rock structures as clearly as in Figure 8-18. Usually he must spend hours studying air photographs and weeks travelling in the bush by canoe, packhorse, or helicopter, trying to find out what the rocks are like below the surface. Field crews make explosions and record the shock waves (just as a ship sends signals to “bounce” off the sea bottom or an iceberg). This tells them something about the rocks below the surface.

Before an oilman may drill a well he must obtain permission from the owner of the land. Finding out who owns a particular drilling area may take much time and money.

If geologists think an area is promising, the *core drill* is brought in. This portable rig, mounted on a truck, drills into the land and brings up rock samples. In this way the prospector can see what the rocks below the surface are like. If these look promising, the decision may be made to “spud in,” which is the oilman’s term for starting the hole.

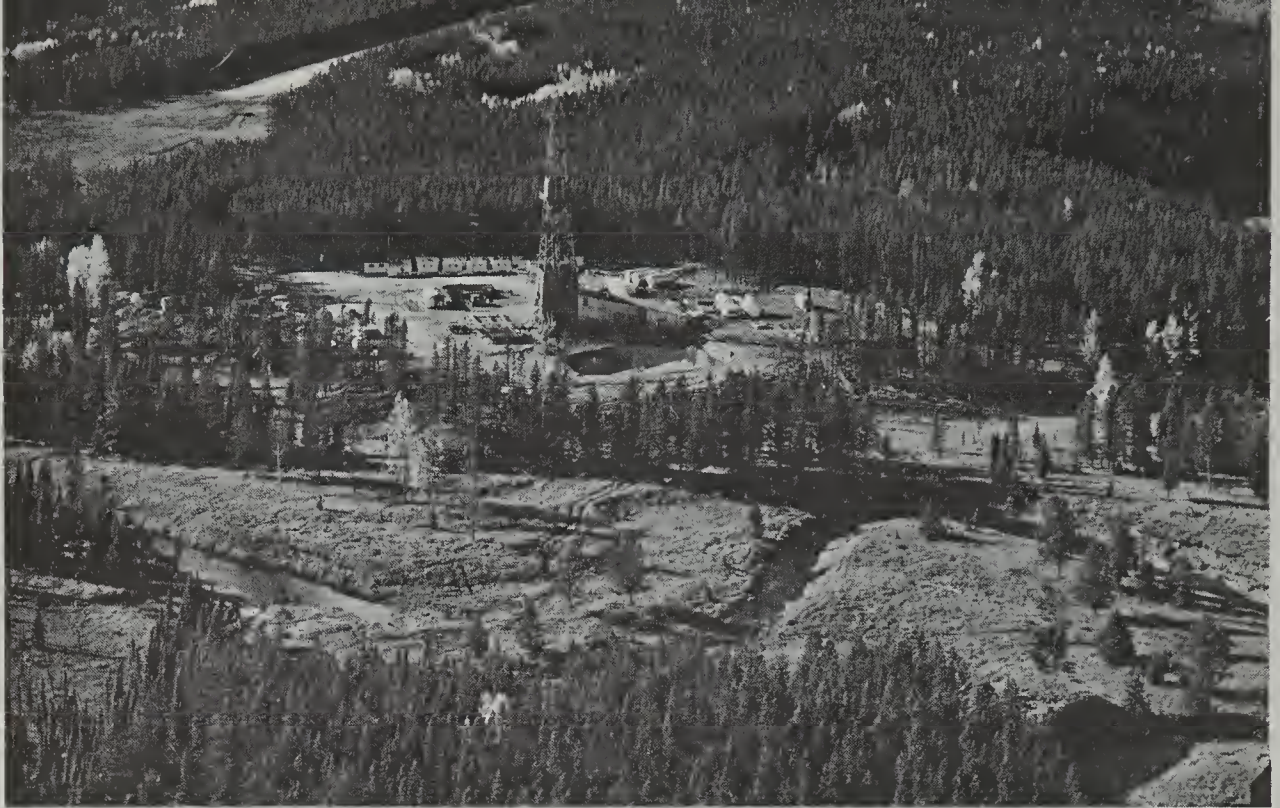
Drilling a well

Figure 8-19 shows a well being drilled in southwestern Alberta. Why is it fairly easy to explore in this region? It is very difficult and expensive for all the heavy equipment to be moved into some areas. Here are some details of the cost of drilling one well, northwest of Calgary. Before drilling started, 89 trips were made to carry all the equipment to the site. Each trip was 56 miles long. For part of the way, rough forest roads were improved and used. In some stretches, a complete new road was cleared through the bush. Drilling continued for 297 days until the bottom of the formation thought to contain oil was reached at a depth of 2½ miles.

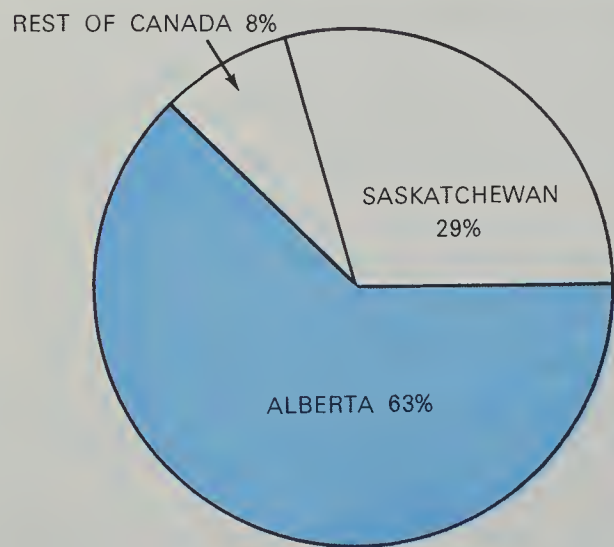
Expenses for drilling the well

Road building.....	\$200,000
Maintaining roads and trucks throughout drilling period.....	20,000
Use of \$1 million rig for 297 days.....	(no figures available)
Bits for drill — 276 @ \$250.....	69,000
Casing to line hole.....	50,000
Core samples brought up by special bit.....	20,000
Fuel for trucks and to run drill.....	72,000
Food for crew.....	600 per week
Wages for crew of 23.....	(no figures available)

When all the men and equipment moved out again over the rough bush road, \$1,111,000 had been spent and no oil discovered. Of 1697 oil and gas wells drilled in Alberta in 1968, 580 were successful oil wells, 349 gas, and 768 dry.



8-20. Drilling a well in a remote part of Alberta (Imperial Oil Limited).



Estimated reserves of Athabasca tar sands—
300,000,000,000 barrels.

Total world production of petroleum, 1958-62—
38,480,778,000 barrels.

8-21. Sources of Canadian oil production in 1966.

Figure 8-22. A comparison of the Athabasca tar sands reserves and recent world production.

8-23. Main oil pipelines and refinery centres.

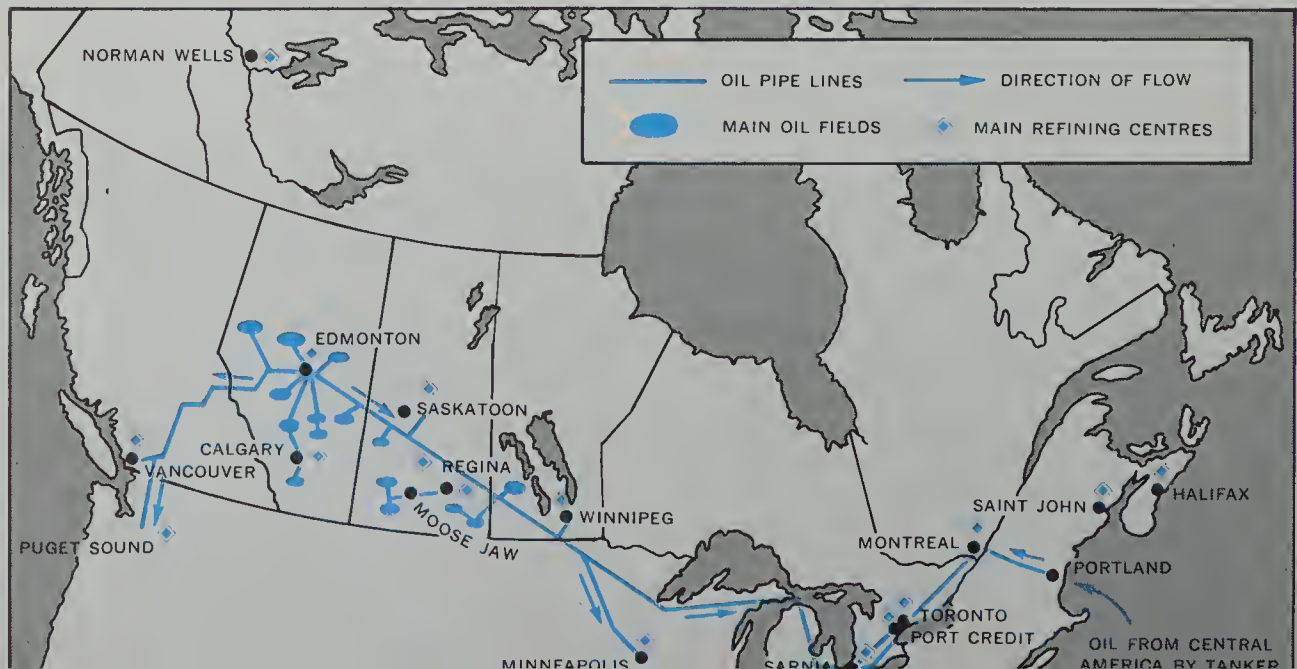


Figure 8-20 shows a drilling rig in the same area. Trails into this site became so impossible to use that supplies were brought in by air for eight months. Locate the landing strip, the drilling rig, fuel tanks, and living quarters in this photograph.

Drilling is very expensive and a dry hole is always a disappointment. But it is not a waste. Valuable information is obtained and added to the oilmen's store of knowledge. Before Leduc No. 1 "blew in" and started the Alberta oil boom, companies had been searching for nearly 20 years for the oil field which they felt sure lay close to Edmonton.

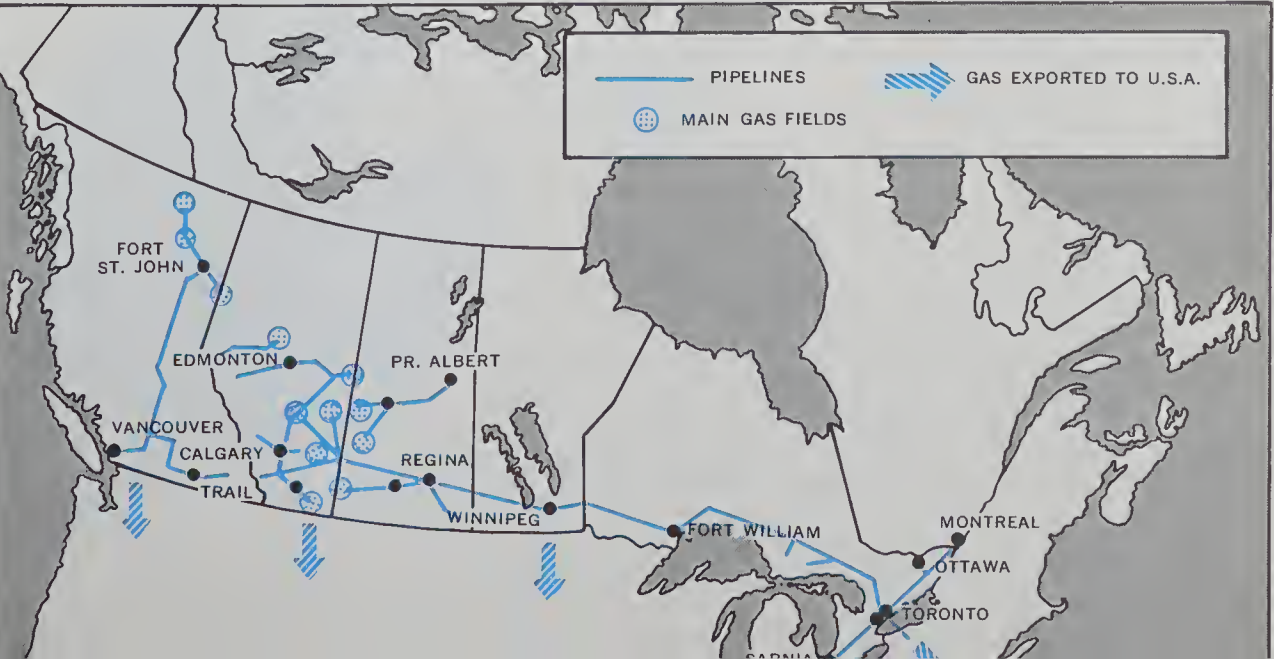
February 13th, 1947 — an important day

Since Leduc No. 1 came into production on this date, many other oil and gas fields have been opened in western Canada. More than 70 per cent of the country's requirements are now supplied by Canadian wells. According to Figure 8-21 what proportion comes from Alberta and Saskatchewan? New fields are discovered every year, and the Athabaska oil sands are believed to contain as much as 300 billion barrels of oil, the largest known reserves in the world. Refer to Figure 8-22 and estimate how this amount compares with the *total world production* since 1958. The tar sands have long been used for surfacing roads and runways, but scientists have only recently discovered a method of extracting the oil cheaply. Suggest other reasons why the reserves of this area have not been developed before now. Plans were made to start large-scale production in 1967.

Oil now supplies nearly half Canada's energy. It fuels all kinds of vehicles and machines. It heats more than half the homes. It lubricates engines and machinery. It is the raw material for plastics, asphalt, and many other products.

Figures 8-23 and 8-24 show how oil and gas are transported to all parts of Canada. How many provinces are supplied by piped oil and gas? How do

8-24. Major natural gas pipelines.



the refineries at Halifax and Saint John obtain oil? Why is it often cheaper for Montreal to buy foreign oil than to use Alberta oil?

The discovery of rich oil reserves in Alberta means that Canada need no longer buy nearly all her oil from foreign countries. In western Canada gasoline prices were reduced, since consumers no longer had to pay the cost of transporting it from elsewhere. Many jobs were available in every phase of oil development, from prospecting to making polyethylene bags from the by-products. Experts think that half of all the money earned in Alberta can be traced directly or indirectly to the oil and natural gas industry. From coast to coast, new refineries and new industries spring up supplying more and more jobs. Canada exports large quantities of oil to the United States.

The wise use of a valuable resource

Millions of gallons of oil are used every day. Unlike hydro-electricity, oil is an exhaustible resource. Once used, it is destroyed. The Alberta Oil and Gas Conservation Board supervises every field in the province. Research has made it possible to advise on the best methods of extracting the oil and its use for various purposes.

Other mineral resources of Alberta

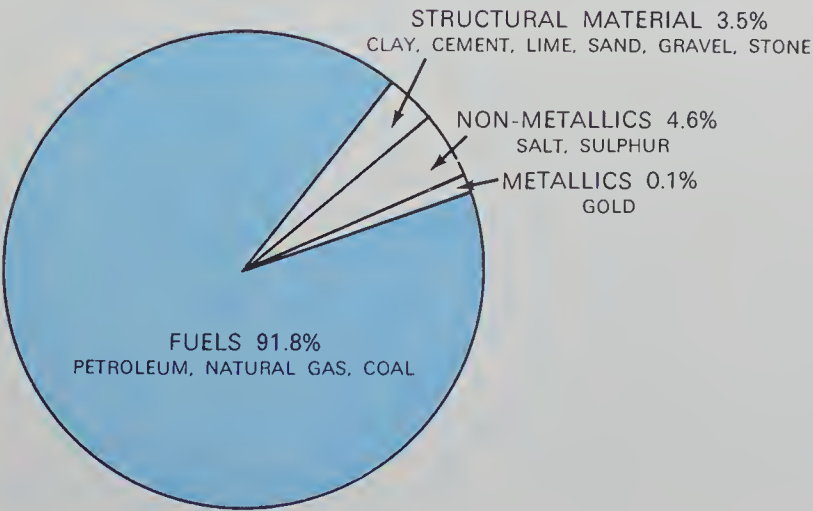
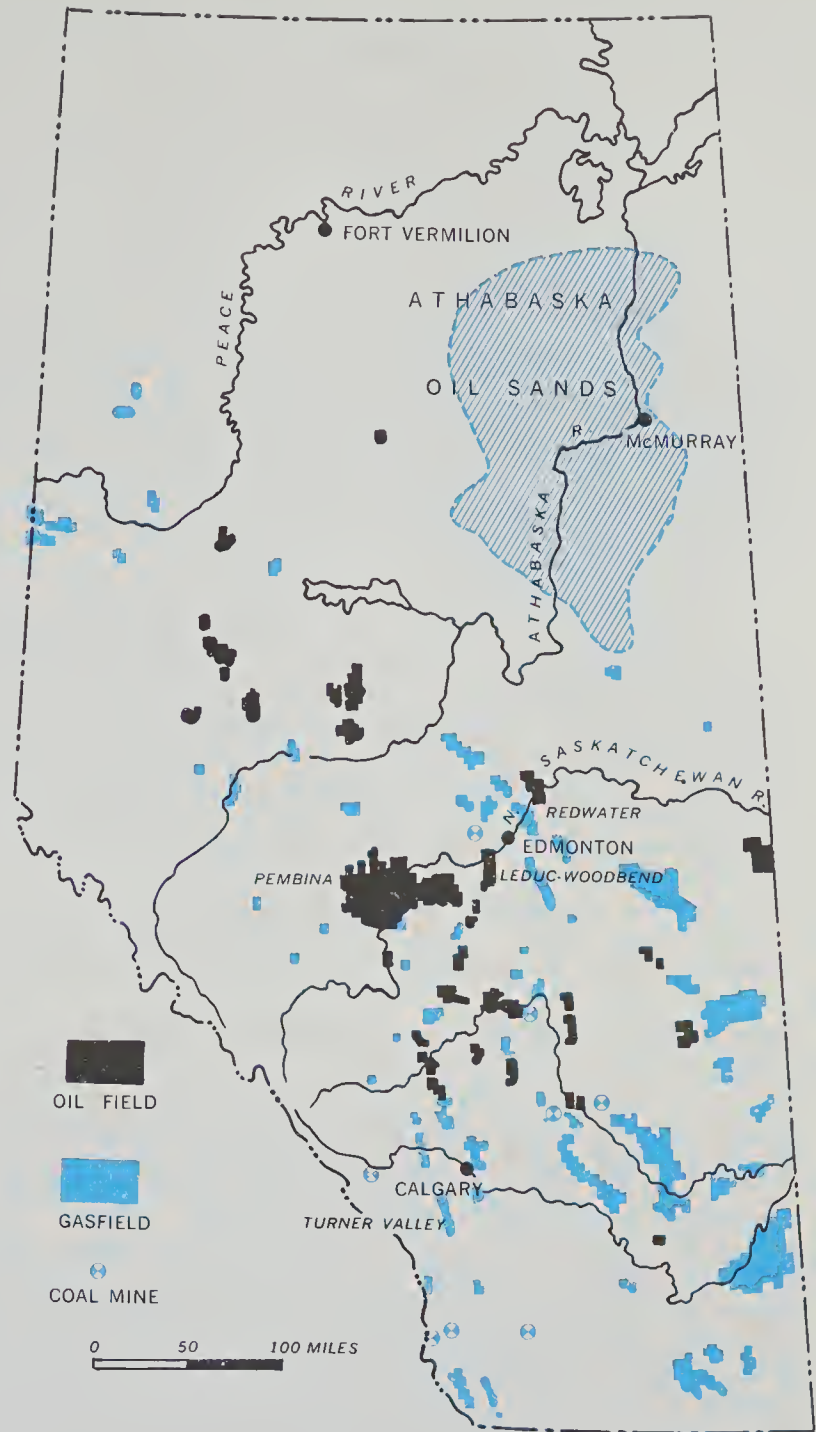
Figure 8-25 shows how Alberta contributes to the total mineral production of Canada. What are the chief mineral products of the provinces which produce more mineral wealth than Alberta? Figure 8-27 shows how much of Alberta's production is accounted for by fuels in addition to oil.

Alberta has the greatest coal reserves in Canada. In which part of the province are the coalfields according to Figure 8-26. These figures show the story of coal mining in Alberta.

8-25. Value of mineral production by provinces, 1966.

Newfoundland.....	\$244,020,086
Prince Edward Island.....	2,756,780
Nova Scotia.....	85,416,974
New Brunswick.....	90,221,237
Quebec.....	762,944,986
Ontario.....	957,857,765
Manitoba.....	179,241,152
Saskatchewan.....	349,303,729
Alberta.....	846,678,642
British Columbia.....	340,843,633
Northwest Territories.....	111,220,178
Yukon.....	11,975,757
Canada.....	<u>3,972,480,919</u>

8-26. The minerals of Alberta.



8-27. Mineral production of Alberta, 1966.

	<i>Production tons</i>	<i>No. of mines</i>	<i>Men employed</i>
1947	8,070,430	191	8761
1968	3,925,114	30	1103

Suggest why coal has declined in relation to other sources of energy. Most of the output is used to produce thermal electricity. Coal is one of Canada's largest imports. Southern Ontario and Quebec import millions of tons each year from the United States. Why do these provinces not use Alberta coal? Increasing demand for fuels may bring about an increase in Alberta coal production in future.

What other minerals are produced in Alberta? Salt is now being mined in the McMurray district and beds five hundred feet thick near Vermilion promise to become the basis of an important industry. Why does Alberta require large quantities of constructional materials? Suggest why Alberta has no great deposits of metallic ores, such as are found in Northern Saskatchewan, Manitoba, Ontario, and Quebec.

Hydro-electric power — another fuel reserve

Figure 8-28 shows the methods by which electricity was produced in the Prairie Provinces in 1968.

Suggest reasons why Alberta makes much less use of hydro-electricity than Manitoba. There are eleven hydro-electric plants on the Bow River west of Calgary. How do figures 8-34, 8-35, and 8-36 suggest that the Bow is a suitable stream for producing hydro-electricity? A large plant has recently opened on the Brazeau River at Big Bend. It has been estimated that a million kilowatts might ultimately be developed in Alberta. Though hydro-electricity is relatively unimportant in Alberta at present, it is one of the province's great resources and may become much more important in the future. What are some of the advantages of hydro-electricity?

Canada's fastest growing cities — Calgary and Edmonton

Between 1951 and 1961 Alberta's two largest cities almost doubled in size. As a result of the oil boom, so many people poured in that many families had to live in motels and trailers until new homes could be built. Calgary is the business centre of the Alberta oil industry, and every major oil company in Canada has offices there.

More than 30,000 United States citizens now live in Calgary. One businessman who moved from New York said after a year, "While Calgary is entirely different — we like it. We went back to Brooklyn to visit last

	<i>Hydro</i>	<i>Thermal</i>
Manitoba	97.8%	2.2%
Saskatchewan	42.8	57.2
Alberta	23.2	76.8

8-28. Sources of electricity.

summer and my wife was ready to return after a few days. The wide open spaces appeal to the whole family.” He added that he intended to take his vacation at home during Stampede week the next year, so that the family could enjoy the fun.

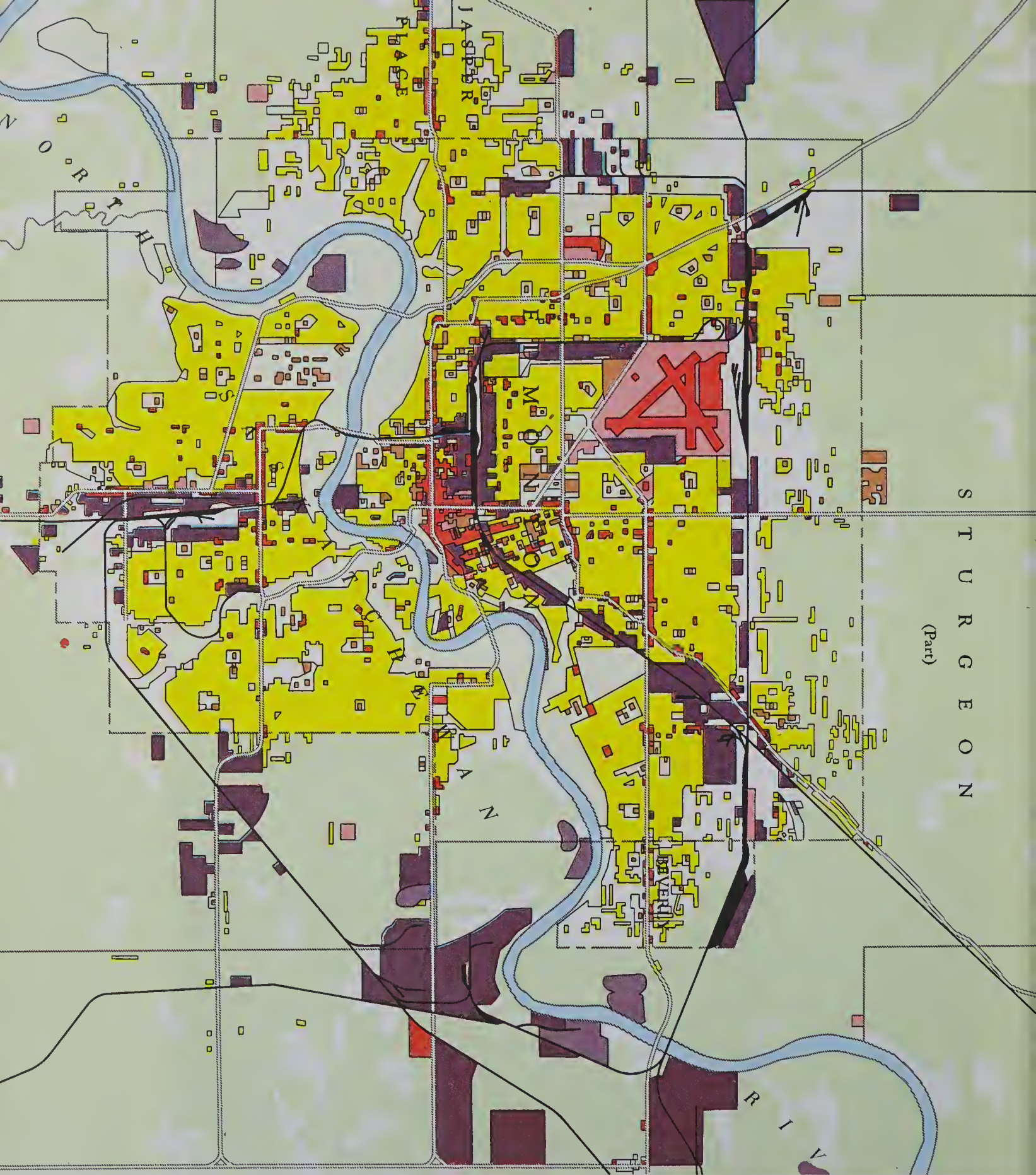
Why do people enjoy living in Calgary?

1. The “wide open spaces” around Calgary have already been mentioned. Calgary lies in the foothills of the Rocky Mountains. Much of the time the snow-capped crests are visible from the city as shown in Figure 8-29. How far away is the resort of Banff according to Figure 8-32? Hunting, fishing, skiing, mountaineering, and many other forms of outdoor recreation are available within an hour’s travel from Calgary.

8-29. The Rocky Mountain skyline and the city of Calgary. Name ways in which the Rocky Mountains are important to Calgary. 8-32 (Air Canada)

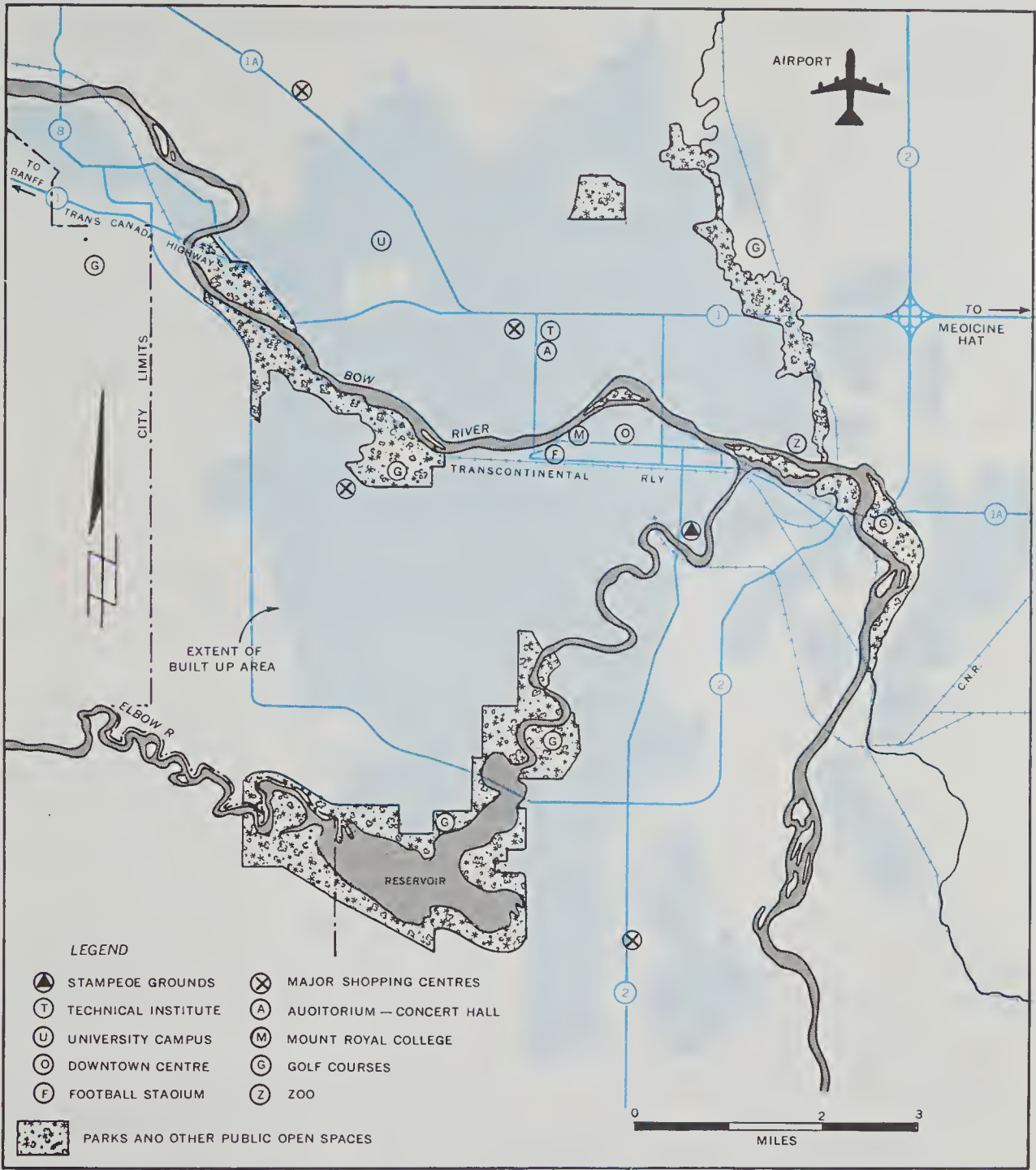


STURGEON (Part)



- Industrial buildings
- Industrial yards, gravel pits
- Commercial buildings and airports
- Commercial yards and parking lots
- Railways and their installations
- Institutional buildings
- Residential buildings
- Parks and playgrounds
- Cemeteries
- Dominantly farmland
- Vacant land
- Municipal boundaries

8-30. A land-use map of Edmonton on the scale of 1:100,000 (from the Atlas of Canada).



8-31. A large-scale map of Calgary.

2. Figure 8-31 is a large-scale map of the city. What rivers meet at Calgary? Like those of most prairie rivers, their valleys are bounded by steep bluffs. Much of the flat land on the valley floors is used by railways and industrial buildings. How has Calgary used some of this land to beautify the city and make it a pleasant place in which to live?

3. What special buildings suggest that many interesting and varied events take place in Calgary?

4. One journalist flying into Calgary on a November day noted with surprise that the temperature was about the same as in Atlanta, Georgia. Refer back to Figure 8-4 and note the average temperature for November.

Suggest a reason for the unusual warmth on that particular day. Frequently warm days of this type provide welcome relief from long periods of cold weather. Some visitors are interested to note that many parking lots have electrical outlets at every space, so that motorists can plug in their engine heaters if they are to be parked in cold weather. The Calgary branch of the Alberta Motor Association usually makes 50 per cent of its service calls between November and February when cars are frequently stalled in the severe cold.* Calgary is 3,438 feet above sea-level. How does this help make summer climatic conditions pleasant? Calgary is one of the sunniest cities in the West; precipitation is low, but there is no shortage of water for all purposes. Why does Calgary have plenty of water available at all seasons?

Why is Calgary a good place to locate industries?

Many new industries are being established in Calgary. Here is how the president of one firm now building a multi-million dollar factory at Calgary explains why they chose to build there.

Calgary has almost everything we need. It has good communications for bringing in goods and for sending out our products. The market in the Calgary area is growing rapidly. River water is available, so is cheap hydro power and natural gas. Our site is on a main highway. We do not have to build access roads. There are plenty of workers available and it will not be hard to attract people to such a pleasant place.

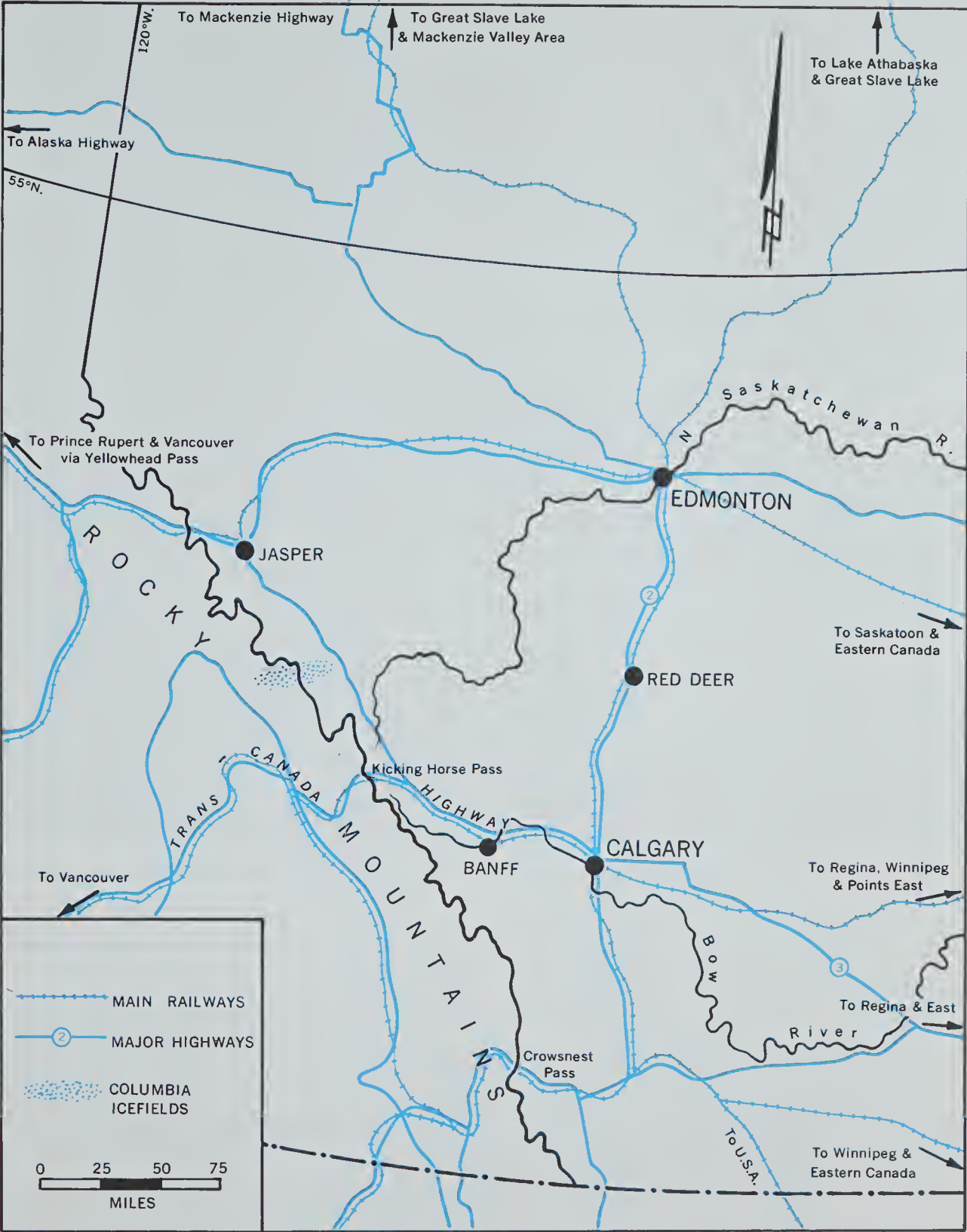
Refer to Figure 8-32 and note Calgary's position carefully. What important pass through the Rockies is close to Calgary? What east-west routes use this pass? What north-south route crosses at Calgary? Why are good communications important to industrial growth?

Factories making products used in everyday life, such as automobile tires or clothing, find it profitable to locate in areas of greatly increasing population. New industries can expect to serve a population of a million within a hundred mile radius of Calgary. What is another advantage of having a large population close to a new factory?

Many industries need large quantities of water. How does the fact that Calgary lies so close to the Rocky Mountains help to explain why the rivers maintain a plentiful supply of pure water all year? What forms of power are available in Calgary?

Calgary began in 1875 as a Northwest Mounted Police post. It was a centre of the ranching country and developed a meat packing industry. It still fulfills these functions. Wheat farming developed, and Calgary added flour milling to its industries. With the arrival of the transcontinental rail-

*For this information the authors are indebted to Mr. W. B. McQueen of the Alberta Motor Association.



8-32. The Circle Tour where the Mountains meet the Plains.

way, it became the chief railway centre of the western part of the prairies. Branch lines improved its communications with the surrounding farmland and it added more agricultural industries and services. The opening of irrigated farmlands to the east added still other industries. Oil was first discovered in the area in 1914. The oil discoveries of the 1940's sparked the greatest period of growth.

Cowboys, Indians, and Mounties are still seen in Calgary. Stockyards and flour mills are still processing the produce of the surrounding farms. But Calgary today looks like any booming western city. Huge industrial developments are spreading along the roads and railways, acres of residential suburbs sprawl around the city, new office buildings rise high above the crowded old section of the central business district, new highways slash through the city, and used car lots extend for miles along the main highways. Calgary expects to continue to grow and is planning accordingly. New industries are being carefully located. Similar industries are grouped together so that services such as rail, water, power, paved roads, and sewers can be supplied as cheaply as possible. Industrial areas are being landscaped and made pleasing in appearance. "Leapfrogging," or the development of new areas some distance from the developed parts of the city, is discouraged, as it requires long and expensive extensions of services such as sewers and water pipes. Parks are being developed wherever possible. Calgary, like most modern cities, plans to become a great industrial centre without sacrificing its natural beauty.

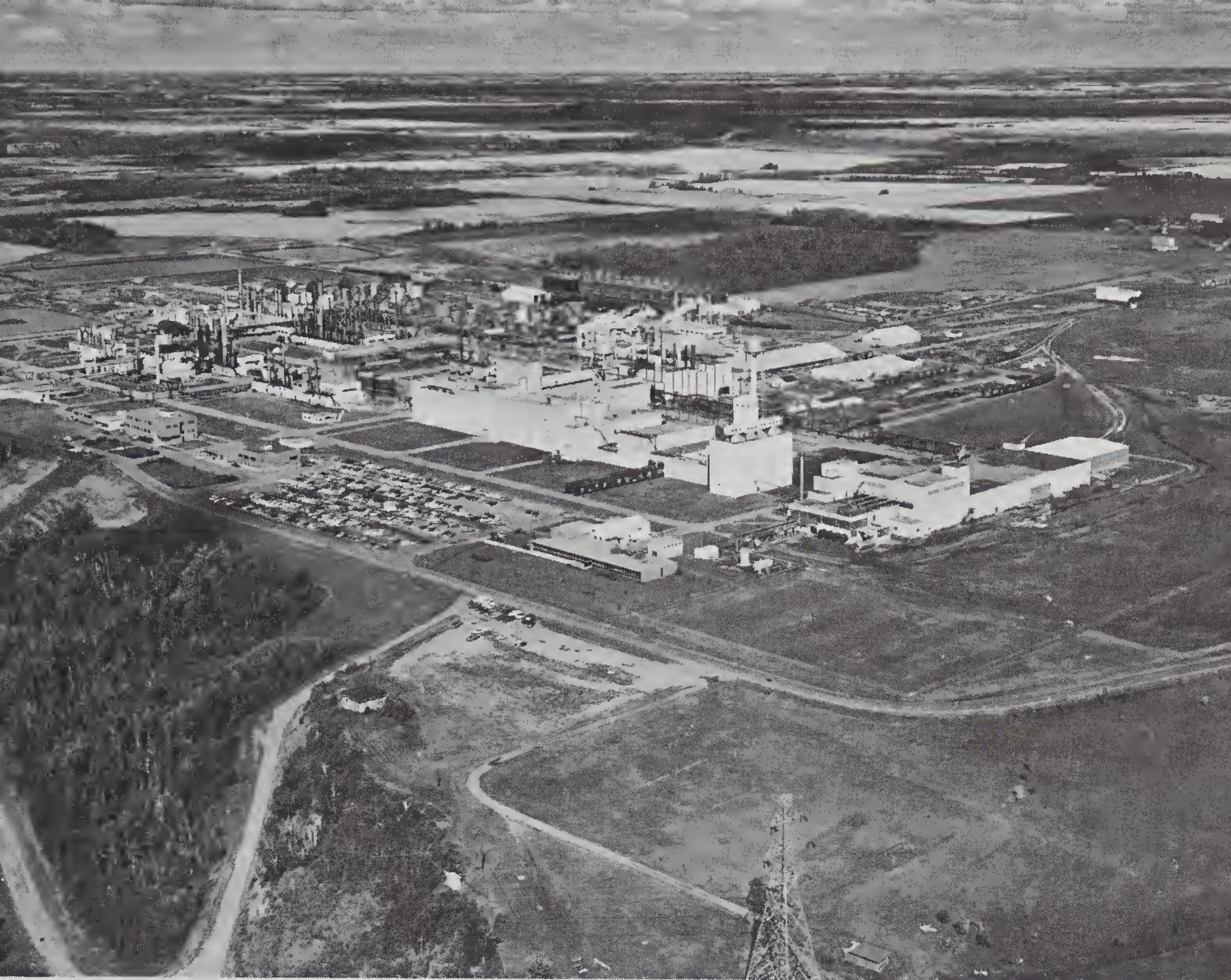
Edmonton — Canada's most northerly metropolis

Edmonton is situated almost 55 degrees north of the equator. Trace this line of latitude across Canada. What part of Ontario is 55 degrees north? It is not surprising that Edmonton first began one hundred and fifty years ago as a fur trading post. Fort Edmonton was built on a high bluff overlooking the river, and traders brought in their furs and trade goods by canoe. Today nearly 400,000 people live in greater Edmonton. They work in factories and refineries, on the railways and highways, and at the airport, in offices and stores, in the university, and in schools, libraries, and museums. Five bridges now span the broad North Saskatchewan River. The city has spread over forty square miles of the wide plateau on both sides of the river, and parks and playgrounds occupy most of the flat land of the valley floor between the steep bluffs on either side.

Why has Edmonton become a great city?

Figure 8-30 is a large-scale map of Edmonton showing how the land is used.

1 What form of transportation serves most of the industrial buildings? In Figure 8-32, count the number of railway lines radiating from Edmonton. Which pass through the Rocky Mountains lies west of Edmonton? How many routes into the north start at Edmonton? The line to Pine Point has recently been built especially to help develop the lead-zinc deposits in that area.



8-33. New industries on the outskirts of Edmonton (Alberta Department of Industry and Tourism).

Edmonton is one of the great railway centres of Canada, and with the building of new roads and railways into the Arctic it is becoming a greater crossroads than ever before. What evidence is there that Edmonton is also a centre for air transport? Since this map was produced, a new airport has been built beyond the main city.

2. Figure 8-33 shows one of the industrial developments on the edge of Edmonton. Most of these have been built since 1945. Suggest what industries are important in these locations. The industries in the centre of the city are older. Edmonton processes the produce of the surrounding countryside and provides services for the people living in the area. Suggest some industries of this type.

3. Oil, gas, coal, and hydro-electricity are all easily available in Edmonton. Where does each of these sources of energy come from?

4. What is most of the land outside the built-up area used for? Describe it as shown in Figure 8-33. Of which farming belt is Edmonton the centre?

5. In Figure 8-30 find the cluster of buildings on the south bank of the river, due south of the airport. These belong to the University of Alberta.

Find the group on the north bank just east of the road and rail bridge. These are the Provincial Government Buildings. Other public buildings include special schools and hospitals, an art gallery, museums, and sports grounds. Suggest why Edmonton was chosen to perform these *service functions* for the whole of Alberta.

Like other cities, Edmonton is studying the best way of developing in the future. With acres of flat land, great quantities of power, and excellent communications in all directions, Edmonton is attracting many new industries. The Edmonton District Planning Commission is trying to locate them where production will be most efficient, and at the same time preserve farmland and recreational areas and develop residential and service areas in pleasant and convenient locations.

Lethbridge, Medicine Hat, Red Deer

These cities are much smaller centres than Edmonton and Calgary. Each is the centre for an important agricultural region. For each city find the answers to the following questions.

1. What is produced by the surrounding countryside?
2. What communications does it have with the surrounding area and with the large cities?
3. What sources of power are available?
4. What industries are important?
5. What services does it perform for the surrounding area?

Non-agricultural resources of Alberta

1. (a) Describe the stages of work necessary before an oil well "blows in." What are the chief problems of prospecting for oil in Alberta? Why do men spend so much time and money looking for oil?

(b) How has the oil boom changed the appearance of the land in Alberta?

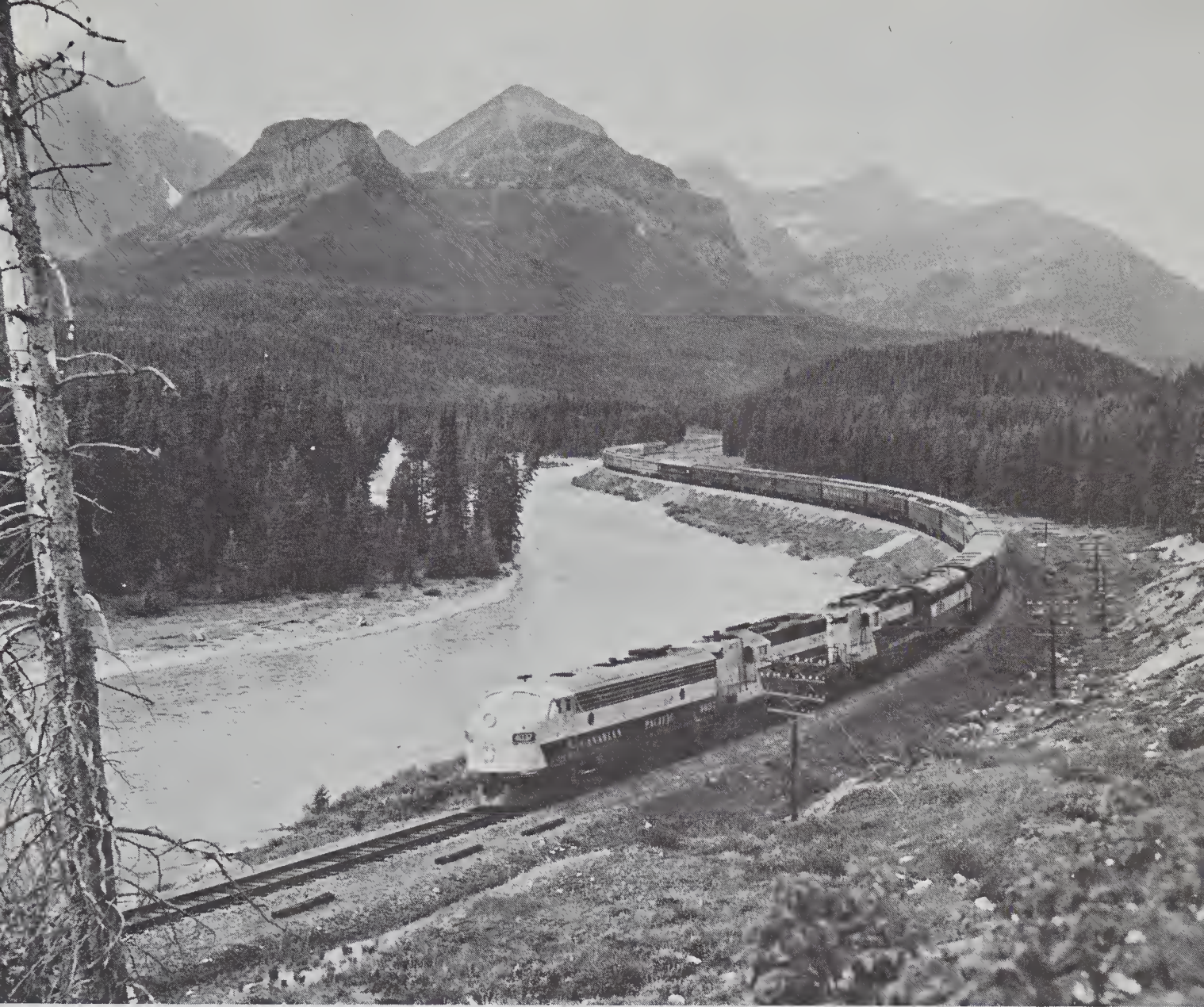
(c) Discuss the reasons why the development of the oil industry in Alberta is important to that province and to Canada as a whole.

(d) Why is it essential that oil reserves should be conserved? What steps have been taken to ensure that Alberta oil is wisely used?

2. (a) Discuss the reasons why coal production in Alberta has declined in the last twenty years.

(b) Why are the growing industries of Alberta well supplied with sources of power?

3. Forests are one of Alberta's great natural resources. Suggest why these forests are much less developed than those of Quebec and Ontario.



8-34. The Transcontinental train climbing towards Kicking Horse Pass (Alberta Department of Industry and Development).

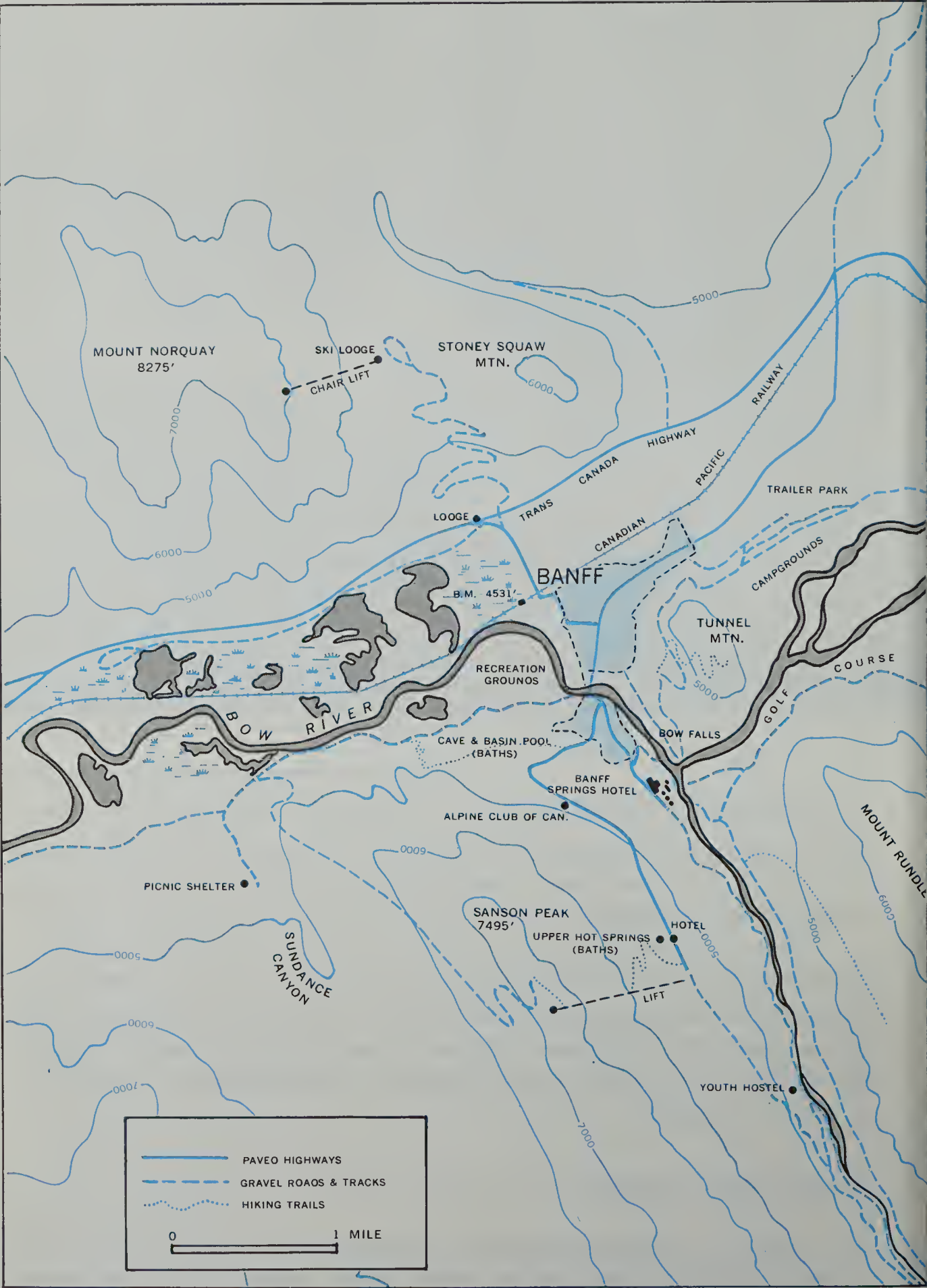
A circle tour through the Rocky Mountains and back to the plains

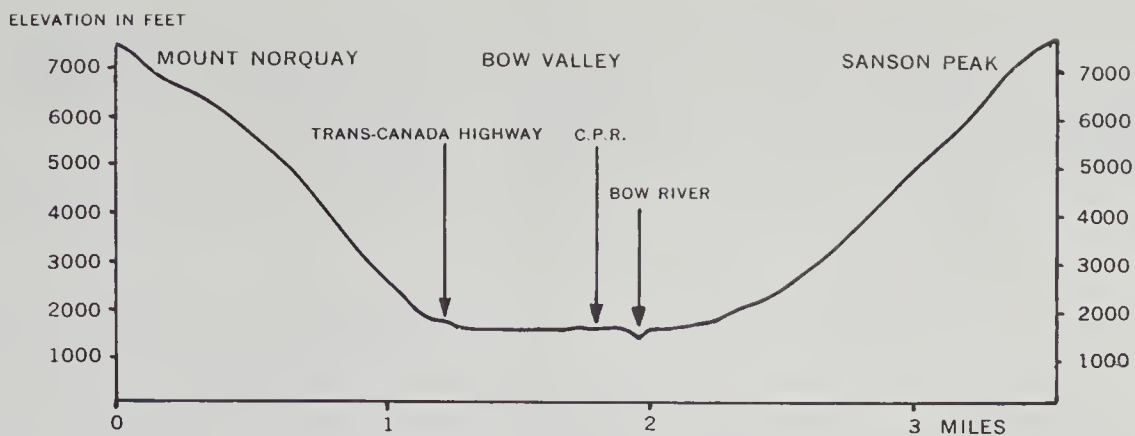
Banff and Jasper are Canada's most famous National Parks. Figure 8-34, showing the transcontinental train snaking its way between the towering peaks, is a common sight on tourist posters in many parts of the world.

When the all-weather highway was completed between Banff and Jasper, it became possible to circle through the Rockies from either Calgary or Edmonton and return through the foothills. In Figure 8-32 trace the route from Calgary via Banff, Jasper, Edmonton, and Red Deer back to Calgary. Which city, Calgary or Edmonton, is closer to the mountains? In what ways is this an advantage?

What to see at Banff

It is possible to make a day trip to Banff from Calgary, but most people wish to linger in this pleasant holiday centre for a longer period. The map in





8-36. A section through the Bow River Valley.

Figure 8-35 and the photograph in Figure 8-37 suggest why this is a popular holiday centre.

1. Name two transcontinental routes which pass through Banff. Why are these routes important to Banff as a tourist centre? Why is this a good way for these main routes to pass through the mountains? Figure 8-36 is a section across the valley from the summit of the Mount Norquay chair lift to Sanson Peak. How wide is the valley floor? *U-shaped valleys* with wide floors of this type have been carved out by glaciers. Which of the following words describe the valley floor well—marshy, treeless, flat, canyon-like, lakestrewn? How high above sea level is the valley floor? How does the map show that the mountain-sides are very steep? How high are the peaks?

8-37. Banff—looking from Mt. Norquay over Banff towards Mt. Rundel (Alberta Department of Industry and Development).



2. How many side roads and tracks start out from Banff? Several small valleys meet in this area. A mountaineer or hiker can start out in a different direction every day and see different views of the country.
3. List all the things on the map that show that this area provides tourist accommodations and recreation facilities.
4. In Figure 8-37, what fraction of the area is forested? What is the chief type of tree? Suggest why the upper mountain slopes are bare of trees.
5. How do you know that the photograph was taken in midsummer?

Visitors to Banff can spend many hours enjoying the beautiful scenery in and around the village. The view from the Mount Norquay chair lift is one of the most spectacular in the Rockies. A rich green carpet of coniferous trees covers the sweeping slopes below. The pale blue ribbon of the Bow River winds through the valley, and the village of Banff is almost lost in the grandeur of its setting. At ground level, the trips along the Bow Valley and around the golf course are noted for the fine views of mountain peaks that change at every curve and corner. There are many short trails alongside

8-38. A close look at the Athabaska Glacier in Jasper National Park (Canadian Government Travel Bureau).



tumbling waterfalls and rushing streams. In National Parks, wild animals are protected from hunters; and deer, bears, and Rocky Mountain sheep and goats are often seen. The marshy land of the Bow Valley is a fine living area for beaver. Dams, ponds, and houses are there for all to see, and sometimes the beavers themselves appear.

A visit to the Columbia Icefield

Travel is slow in National Parks when new views are to be admired at every corner, but a journey of a few hours takes visitors from Banff into the narrow cleft of Marble Canyon on the British Columbia side of the Rockies; or into the great Kicking Horse Pass, where the main road and rail routes wind their way through the height of the range; or to Lake Louise, where high peaks surround the deep blue lake, while the shining white glaciers seem about to tumble into the still waters. One of the most popular trips is to the Columbia Icefields.

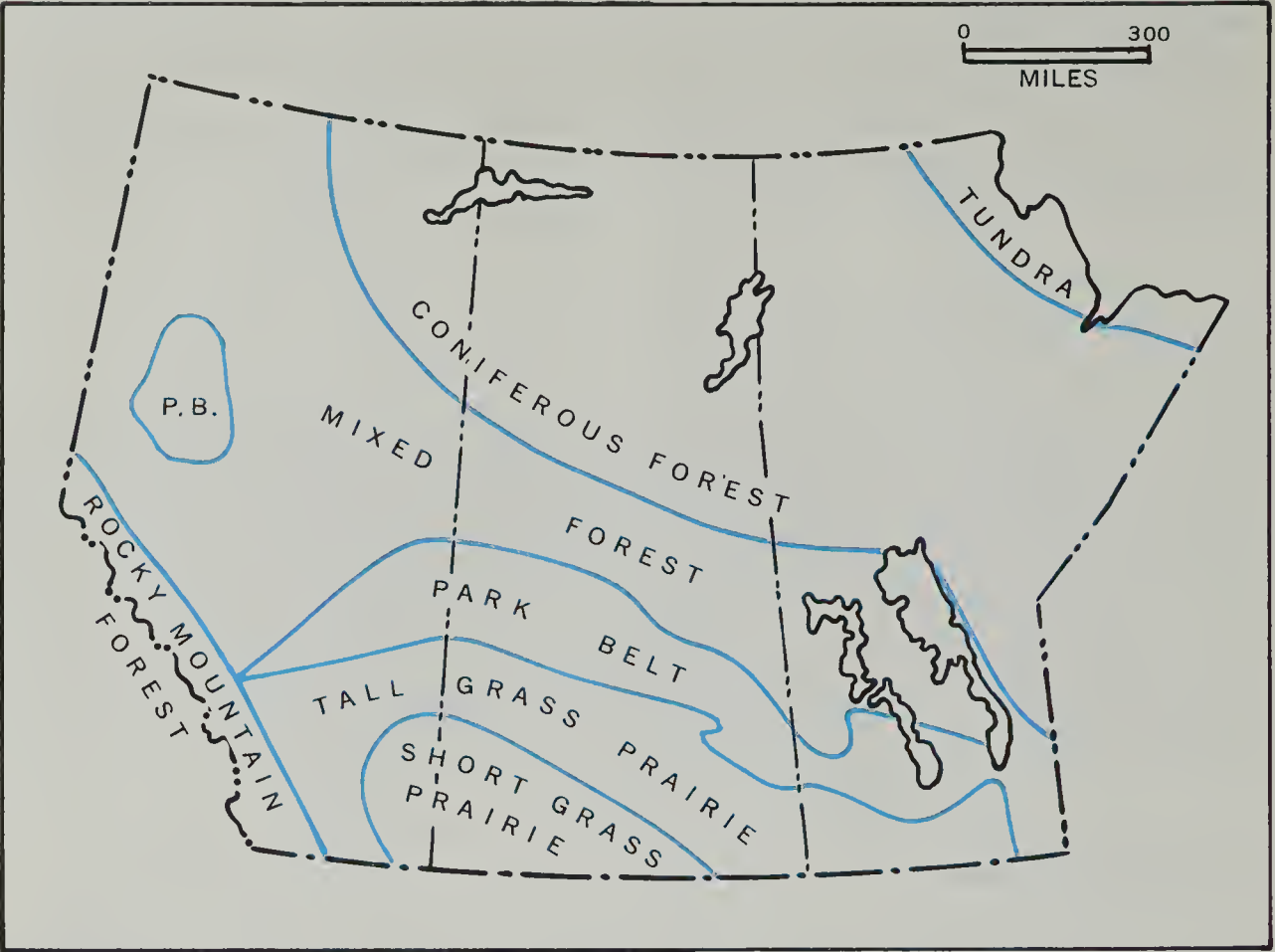
A glacier at work

1. Figure 8-38 is a photograph of the Athabaska glacier which can be located in Figure 8-32. Imagine you are one of the people shown in the foreground. Comment on the size of the glacier. What does the surface look like? A glacier is really a river of ice. Which letter in Figure 8-38 shows tributary glaciers flowing into the main valley?

2. You are standing on sand, gravel, mud, and rocks which were carried along by the ice and dumped when it retreated. This *moraine* has been formed very recently, and you can see how it is made much more easily than you can those in Southern Ontario where they have been covered with vegetation and used by farmers. Which letter shows how a moraine has also been built up at the sides of the glacier?

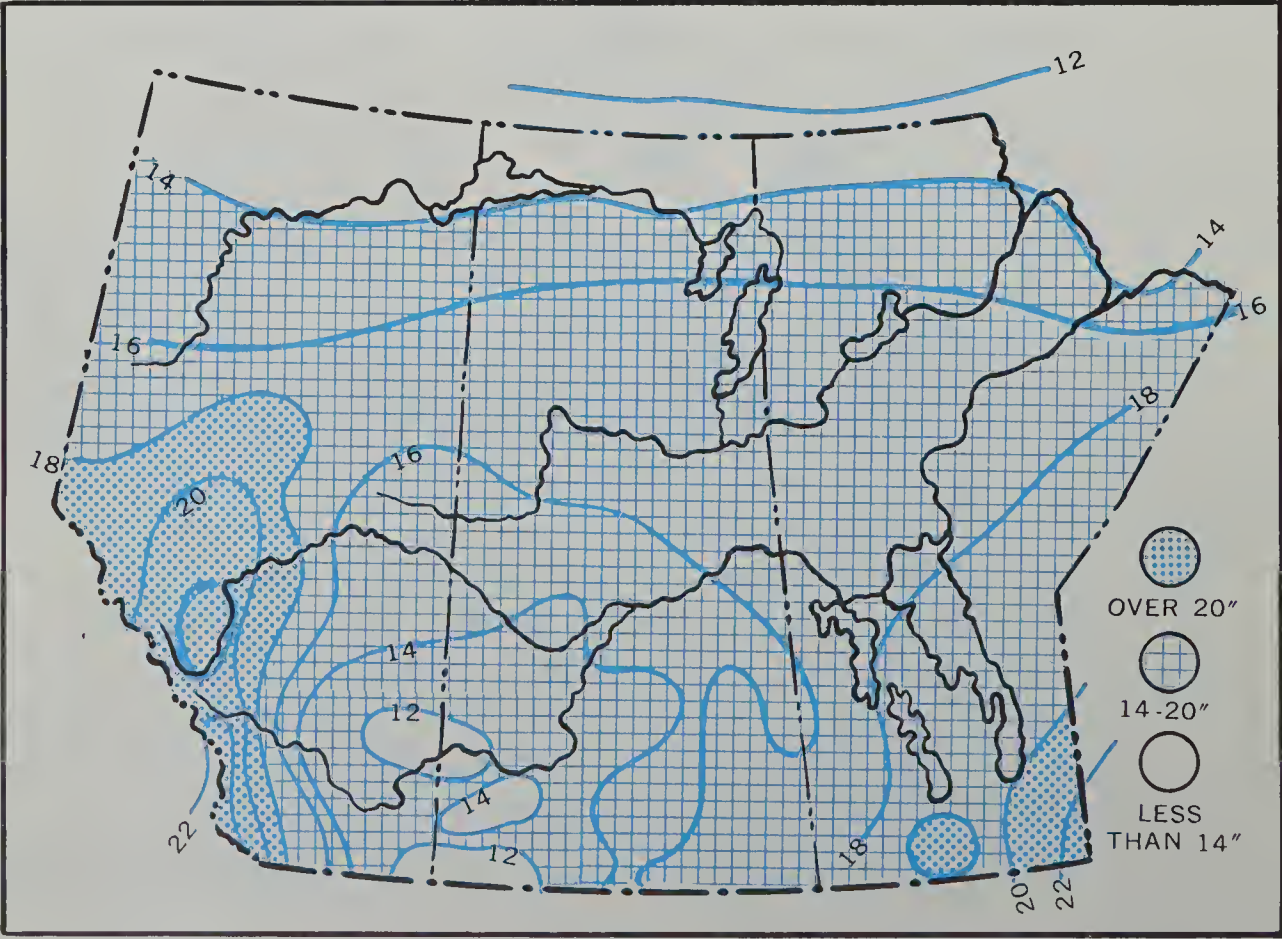
3. Many of the lakes in the Canadian Shield were formed by water damming up behind material deposited by glaciers. At this point you can see such a *moraine-dammed lake* being formed. Where is the water in this lake coming from? How can you tell that it is very cold?

4. If water freezes in a pipe it expands and the pipe cracks. Ice in the mountains does exactly the same thing to the rocks around it. The rocks are constantly being *frost-shattered*, and very sharp, rocky ridges are a common sight in glaciated mountains. Which letter shows a sharp frost-shattered ridge? The big armchair-shaped hollow surrounded by such a ridge is known as a *cirque*. These cirques fill with snow and ice and it is from these hollows, high up on the mountain peaks, that the ice spills over to form the source of a glacier.



8-39A. Vegetation belts.

8-39B. Mean annual precipitation.



At the Columbia Icefield, you can see ice at work forming the type of scenery that is common in the high mountain ranges of Alberta and British Columbia. Explain how the ice does its work. How would you recognize features that have been formed by ice action?

On to Edmonton

The mountain scenery in Jasper National Park is very similar to that in the Banff area. The Banff-Jasper Highway travels in a northwest-southeast direction parallel to the main trend of the mountain ranges. At Jasper one must turn and travel across the ranges — either through the passes into British Columbia or eastward through the foothills to the plains. Gradually the mountain skyline disappears in the distance. For many miles the road passes through very wild, undeveloped country such as that shown in Figure 8-20, but as it approaches Edmonton rich farmlands spread out on either side. Ahead lie the open spaces of the plains; behind, the high peaks are lost in the distance. The trip southward back to Calgary is through rolling country of the mixed farming zone. This is part of the foothills, where the mountains meet the plains. For nearly a thousand miles the plains stretch eastward; to the west, high mountains dominate every mile of the landscape to the Pacific coast.

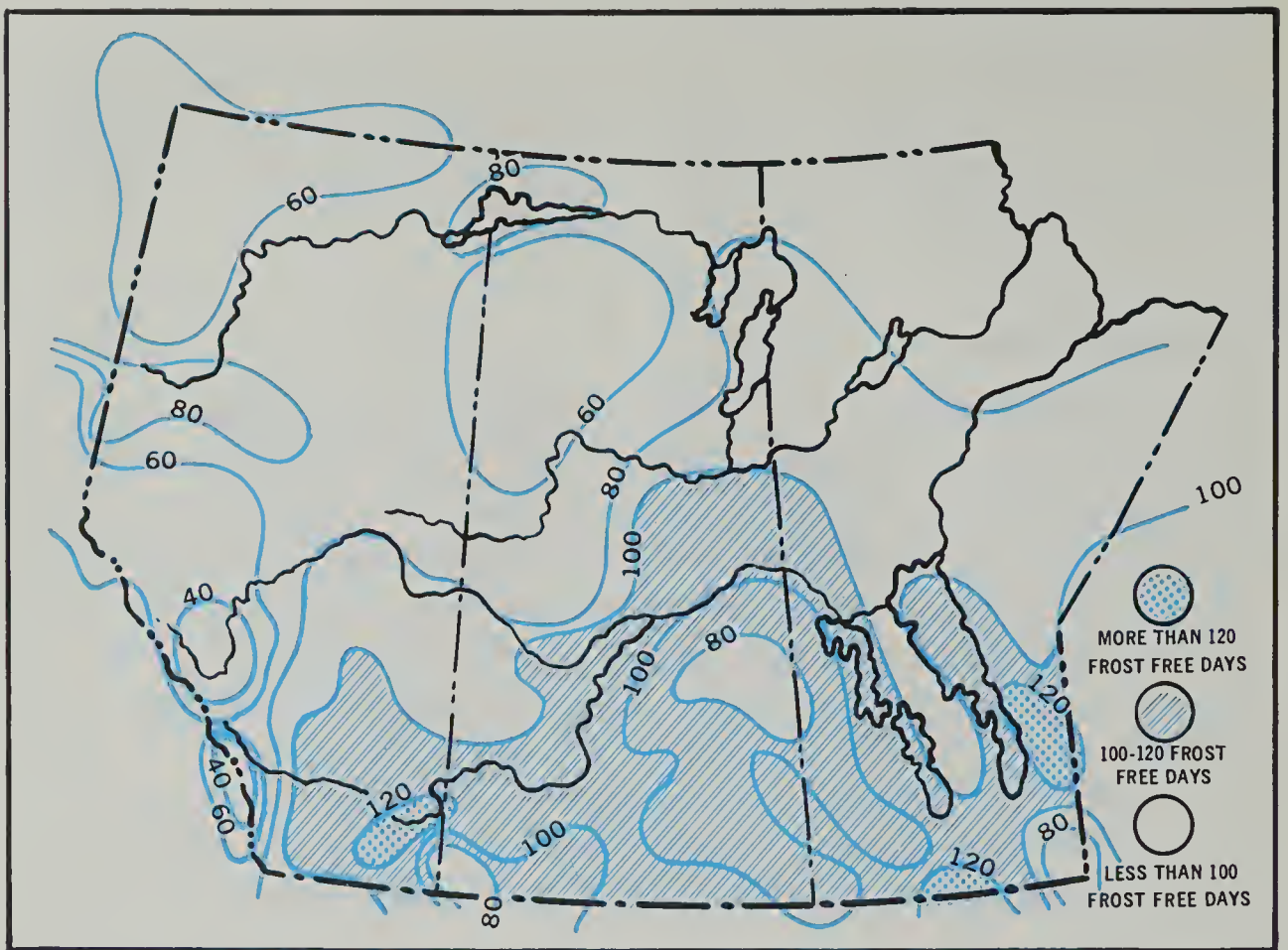
Making good use of varied natural resources

- 1. Why does Alberta have a greater variety of landscapes than the other Prairie Provinces?
- 2. Give reasons why so many people are moving into Alberta, which is Canada's fastest growing province.
- 3. Name some ways in which Alberta is trying to make the best possible use of its various natural resources.

An overall view of the Prairie Provinces

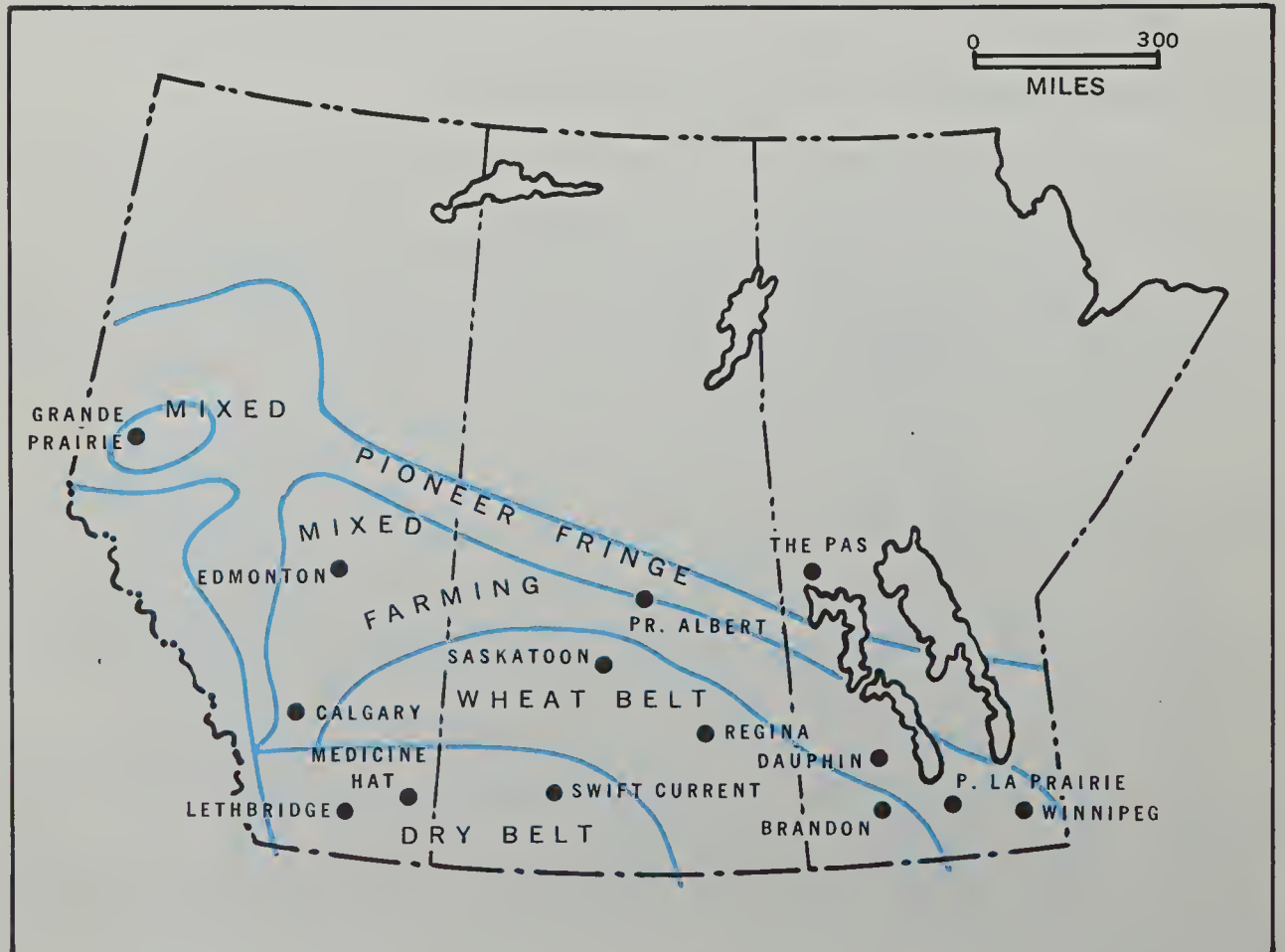
- 1. Our word "prairie" comes from a Latin word meaning "meadow." Here is how the Oxford Dictionary describes a prairie: "A tract of level or undulating* land, without trees, and usually of great extent."
 - (a) Name three features described as typical of prairie landscape.
 - (b) How does Figure 8-39A suggest that "prairie" is not a good term to describe these provinces as a whole?
 - (c) What different types of landscape exist within the *prairie* sections of these provinces?

*Very gently rolling.



8-39C. Length of frost-free season.

8-39D. Agricultural regions of the prairies.



2. (a) How does Figure 8-39D help explain why Saskatchewan, even more than Manitoba and Alberta, is associated with wheat?

(b) How has Saskatchewan changed from a “one product” province? Why is this better for Saskatchewan?

3. (a) How does Figure 8-39B help to explain why drought is considered one of the greatest problems of the prairies?

(b) In which province do the farmlands suffer *least* from drought?

(c) Southwestern Alberta has above-average precipitation for the Prairie Provinces. Why, then, is this not a major farming region?

(d) Name several ways in which the problems of drought on the prairies are being overcome.

(e) What are the other climatic problems of the prairies? How are attempts being made to overcome them?

(f) What are the chief advantages of the prairie climate for grain growing?

(g) Why is wind both an advantage and a disadvantage to the prairie farmers?

4. The Park Belt, shown in Figure 8-39A, is a *transition* area between two very different vegetation belts. What do you expect the countryside in this region to look like?

5. Draw two columns in your notebook, on the blackboard, or on a wall chart. Discuss the contrasts between the northern and southern halves of the Prairie Provinces, and record your findings in the two columns.

(a) What are the chief problems of living in the north?

(b) Why are these vast northern areas of great value to the Prairie Provinces?

(c) What great advantage does northern Manitoba have at present?

6. In which parts of the Prairie Provinces would you find the following:

(a) the highest land

(b) the areas nearest to ice-free ports

(c) seacoast

(d) cities most centrally located for marketing goods and services within the Prairie Provinces as a whole.

Why is each of these factors a great advantage to the areas concerned?

7. (a) What are the chief natural resources of the Prairie Provinces?

(b) Name some ways in which they have been developed in recent years.

(c) How are the Prairie Provinces trying to conserve their natural resources?

DATE DUE SLIP

RETURN

DATE DUE SLIP	
	EDUC MAR 04 '93
DUE EDUC MAR 09 '88	FEB 19 RETURN
MAR 03 RETURN	DUE EDUC FEB 02 '90
DUE EDUC MAR 27 '89	DUE EDUC FEB 16 '94
APR 03 RETURN	RETURN FEB 10 '94
DUE EDUC APR 14 '89	DUE EDUC JUN 07 '94
DUE EDUC APR 21 '89	RETURN JUN 14 '94
APR 22 RETURN	
DUE EDUC OCT 08 '90	
OCT 11 RETURN	
EDUC OCT 26 '90	
OCT 15 RETURN	
DUE EDUC MAR 27 '91	OCT 20 RETURN
FEB 19 RETURN	
EDUC FEB 25 '93	
FEB 17 RETURN	

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